



FRIDAY, JUNE 16, 1899.

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## Contributions.

## Railroads and Population of India and Mexico.

New York, June 6.

To the Editor of the Railroad Gazette:

Reading your valuable paper, as has been my practice for 30 years, I find in the last issue a table, p. 381 (you see I have my statistics O. K. as far as I have gone) showing the railroad mileage of the world at the end of 1897. In this, British India, with 21,002 miles, has 0.68 miles per 10,000 population. Now for some time I have understood that British India has 360,000,000 inhabitants, and if we add the railroads of Ceylon we only have 0.59.

Again, Mexico is put down with 7,384 miles and 5.84 per 10,000. I have never heard over 12,000,000 inhabitants claimed for Mexico, which should give 6.15. Is your Dutch authority wrong, or has your unregenerate style of life got into your habit of conversion?

[The table published in the Archiv für Eisenbahnwesen gives the kilometers of railroad for 10,000 people in British India as 1.1. This, multiplied by 0.621, gives the miles 0.6831; or rejecting two places 0.68 as we used it. On testing the Archiv's table we find that population divided into kilometers gives the kilometers per 10,000 as 1.16; or miles = 0.72, which is closer to the fact than 0.68. The Archiv takes the population of British India as 291,381,000. The Statesman's Year-Book for 1899 makes it 287,123,350 in 1891. In 1897 it could not have been far from 291,000,000.

The population of Mexico is given in the Archiv table as 12,620,000 and in the Statesman's Year-Book as 12,619,959. Using this divisor and the mileage given in our table we get 5.85 instead of 5.84, as the quotient, which seems to be near enough.

We are sorry to have to take what "N" calls "Dutch authority" for this class of statistics, but we cannot find them home made. A new Dingley must arise and prohibit the importation of pauper-made statistics and let N. develop his infant industry.—Editor Railroad Gazette.]

A. J. Cassatt.

The successor of Mr. Frank Thomson as President of the Pennsylvania Railroad Company is Mr. Alexander Johnston Cassatt, who has been a Director of the company for many years and who was formerly a prominent and active officer, but who has held no office, except that of Director, since 1882. The Pennsylvania Railroad directors are, however, a body of active managers—a board of directors who really direct—and Mr. Cassatt, as a member of the board, has kept constantly in contact with the detailed affairs of the company's business. As will be seen by the following paragraphs, his experience in the service has been as varied and extensive as that of Messrs. Roberts, Thomson and the others who have risen to high places in the management, so that except for the interregnum of 17 years, he is in line for promotion, according to the well-established rule. And, for the reason already suggested, the interregnum is more apparent than real.

Mr. Cassatt was born in Pittsburgh, Pa., Dec. 8, 1839. His father was a prominent business man and afterwards became a banker in Philadelphia. A. J.

Cassatt was educated in his early years in Heidelberg, his father having removed temporarily to Europe; and upon the return of the family to America the young man entered the Rensselaer Polytechnic Institute at Troy, from which he was graduated in 1859 as civil engineer. His first railroad work was on location and construction in Georgia, before the war. He was appointed rodman on the Philadelphia Division of the Pennsylvania in 1861 and worked on the Connecting Railroad between the Pennsylvania and the Philadelphia & Trenton. In 1864 he was made Resident Engineer of the Middle Division of the Philadelphia & Erie. Next he was made Manager of the Warren & Franklin, one of the company's enterprises in Northwestern Pennsylvania, and soon after he became Assistant General Superintendent of the Philadelphia & Erie. In April, 1866, he was made Superintendent of Motive Power of the Philadelphia & Erie and the following year was promoted to the same position at Altoona. On April 1, 1870, he succeeded Dr. Edward H. Williams as General Superintendent of the Pennsylvania Railroad, and when the Pennsylvania leased the United Railroads of New Jersey, in December, 1871, he was made General Manager, being the first incumbent of this office.

It was in this place chiefly that he established his reputation as an administrative officer. What is now the great Pennsylvania System was then being formed, and the organizing hand of the general manager was an important element in the success of all departments. The New Jersey lines were poorly organized and not very well equipped. The magnificent floating equipment of the road at New York and Philadelphia was organized under Mr. Cassatt's administration. Important problems of car and engine equipment had to be settled and standards were decided upon in those years which have since been copied extensively.

Mr. Cassatt became Third Vice-President on July 1, 1874, and in 1880 was made First Vice-President. In this office he was charged with the administration of the operating and traffic departments and, of course, had an important voice in the general policy of the company. On Sept. 30, 1882, Mr. Cassatt resigned the Vice-Presidency, with the purpose of enjoying life in a more leisurely way; but a year or two later he was induced to again take a seat in the Board of Directors. When the New York, Philadelphia & Norfolk was built he became its President. This is the Pennsylvania's line to Cape Charles. In 1891 President Harrison appointed Mr. Cassatt one of the three commissioners on the Intercontinental railroad project, and in 1892 he was appointed one of the Board of Visitors of the West Point Military Academy.

Mr. Cassatt is a horseman and has bred and owned some famous winners. For 15 years or more he has served Merion township, where he lives, as Supervisor of Roads, and probably maintains the best and cheapest roads in the State.

Mr. Cassatt was married in 1878 to Miss Lois Buchanan, daughter of an Episcopal clergyman and niece of President James Buchanan.

## The M. C. B. Convention.

The 23d annual convention of the Master Car Builders' Association meets just as we go to press, and therefore we can give no report of it this week. Abstracts of most of the reports presented follow.

## Brake Shoe Tests.

Since the original tests made by the committee there has been considerable activity in the way of developing brake shoes to produce greater efficiency, with the view particularly of obtaining greater durability of brake shoes in service. This effort has been in the direction of composite, or composition shoes, and while greater durability is very much desired, it is also important to the railroads in general that durability should not be obtained at the sacrifice of proper braking power. There are perhaps three or four new shoes being made to-day which it might be well for the Association to have tested under the direction of the committee, with the view of determining their frictional value, comparing them with the original tests of hard and soft cast iron, and the committee would recommend that it be instructed to test such brake shoes as may be presented to it for that purpose and which may seem to have made sufficient departure from those previously tested to have affected their efficiency or durability.

This report is signed by S. P. Bush, R. P. C. Sanderson and Geo. Gibbs.

## Trains Parting.

Replies to a circular letter were received from only 8 out of 189 roads, which represent about 10 per cent. of the cars in the Association. Of these there were 2,606 cases of trains parting between December 1, 1898, and April 1, 1899, 47 per cent. of which were caused through the fault of the forward car at the point of parting. Of the partings 45 per cent. occurred when pulling out and 25 per cent. when slackening up. The draft rigging broke in 21 per cent. of the cases, knuckles broke in 9 per cent., about 1 per cent. of the partings were caused by difference in the

height of cars, 1 per cent. by ice or gravel preventing coupling and 9 per cent. on account of worn knuckles.

Of the break-in-twos reported, 67 per cent. occurred with cars equipped with M. C. B. couplers, and the others with cars fitted with both link-and-pin draw-bars, or one link-and-pin and one M. C. B. coupler. The causes for trains parting that were equipped with M. C. B. couplers are as follows:

Defective locks .....	17.46 per cent.
Worn knuckles .....	13.08 "
Defective uncoupler attachment .....	5.58 "
Broken coupler body .....	7.97 "
Defective draft rigging .....	9.76 "
Broken knuckles .....	13.81 "
Miscellaneous causes .....	32.34 "

The committee recommended greater care to avoid sharp corners at the rear of the coupler yoke, and that spindles should not be less than 2 in. in diameter and keys not less than 1/2 x 2 in. Also M. C. B. couplers should be systematically inspected for wear and a gage used for this purpose. All but Mr. Hodge recommended the use of M. C. B. buffer blocks to relieve the draft rigging of shocks.

The report is signed by Mr. G. N. Dow, John Hodge, D. Hawksworth and J. M. Holt.

## Compensation for Car Repairs Done West of the 105th Meridian.

The committee collected information as to the actual cost of the different materials used in the repairs of freight cars in different parts of the country, which formed an elaborate statement. This also showed the mileage made by cars on foreign roads and the mileage of foreign cars made on each road reporting, and the amounts collected and paid for car mileage and for car repairs. A second statement copied from the Interstate Commerce Commission's Report for the year ending June 30th, 1896, showed the freight earnings per ton per mile for a large number of roads. The committee presented a discussion of this question based upon these statistics and concluded that in view of the complexity of the differential question, of the variation in remuneration and cost of repairs, which varies in all sections of the country, it could not recommend any change in the established policy of uniform prices for all parts of the country.

This report is signed by J. N. Barr, S. P. Bush, L. C. Haynes and T. B. Kirby; J. H. McConnell, a member of the committee, does not sign this report.

## M. C. B. Couplers.

The topic may be divided into three parts: 1, to define the contour lines more fully when new; 2, to define the contour lines more fully when worn; 3, to propose specifications for couplers.

1. To define the contour lines more fully when new. This part of the subject can again be divided into four parts, none of which are covered by present M. C. B. standards: (A) To fix the length of the guard arm; (B) The vertical dimension of the knuckle; (C) The vertical dimension of the end of the guard arm, and (D), To refer the axes upon which the contour lines are constructed to the axis of the shank of the coupler.

(A) In regard to the length of the guard arm, it is recommended that the contour lines be extended about 1 in. beyond the point where they at present terminate, and that the M. C. B. Standard Limit Gages for new couplers have the guard arm screw moved from its present position to a new one at the end of the proposed new contour lines. The proposed contour line is shown in Fig. 1 and the proposed gage for new couplers is shown in Fig. 3. The reverse curve of 8 in. radius has been straightened out and continued as a tangent to the arc drawn with the 2 1/2-in. radius. It is also reduced in flare so as to hold the couplers together better. There is a limit to which the length of the guard arm may be extended, as after a certain point has been reached, any added length is not only useless but renders the part more liable to damage. The change in the gage is the extension of the frame and the re-location of the present guard arm limit screw so as to control the end of the guard arm contour. By placing the limit screw at the extreme end of the proposed new guard arm, makers will be compelled to keep the contour correct; for, by the terms of the gaging, if the gage passes with any one movable point out, the coupler is rejected.

(B) It is recommended that the vertical dimension of knuckles be fixed at 9 in. as a minimum. It is obvious that any decrease of this dimension renders separation more liable, due to variation in height of couplers.

(C) It is recommended that the vertical dimension of the end of the guard arm be fixed at 7 1/2 in. as a minimum. The present vertical dimension of the end of the guard arm is indefinite. Some are brought down more sharply than others, thus giving more chance for the couplers of a high and a low car to jump past each other.

(D) It is recommended that the twist gage for new couplers, shown in Fig. 11, be used so as to insure that the heads are neither twisted nor displaced sidewise with relation to the shank. The axes on which the M. C. B. contour lines are laid down are not referred to the axis of the barrel or shank of the coupler. As a result, it may happen that the head of the coupler may be twisted with relation to the shank, so that the transverse axis or the vertical axis of the contour lines is not normal to the longitudinal axis of the coupler as a whole. It may also happen that the whole head of the coupler is displaced bodily to the right or left of the center line. The body of the gage is a duplicate of the M. C. B. gage for new couplers, provided with the long guard arm, and the contour is the same as



the M. C. B. gage with all movable points drawn back. It is, therefore, sure to enter every coupler that has been properly inspected by the other gage. The arm extending back over the shank is provided with hardened steel pins, one pair of which must drop down over the square part of the shank immediately behind the head, and the other pair over the block upon which

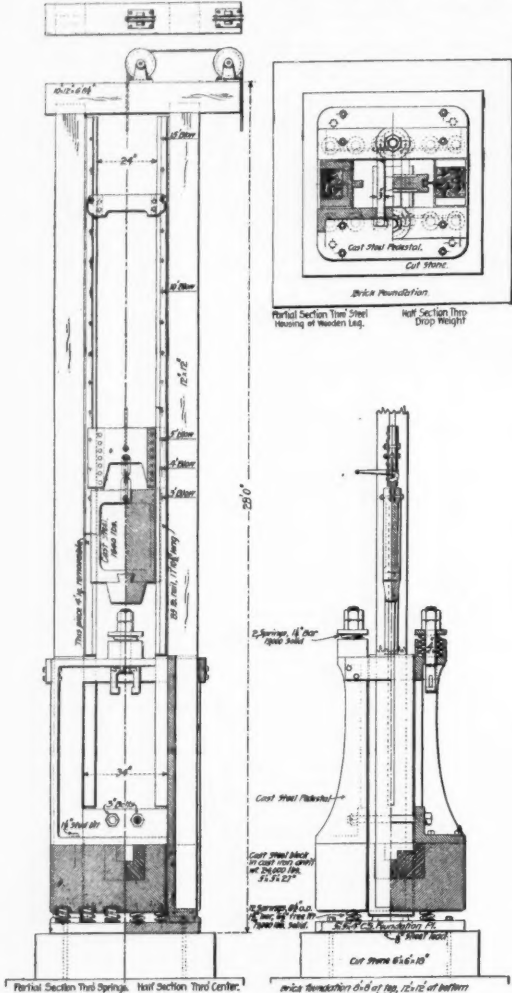


Fig. 68.—Proposed M. C. B. Drop Test Machine.

the yoke is riveted. There is sufficient play between these pairs of points to allow makers proper variations, but badly distorted castings are discovered when the pins interfere with the proper seating of the gage.

In addition to these matters relating strictly to the contour line, there are others that require attention:

(E) It is recommended that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm. By the action of Congress the height of drawbar has been fixed at 34 1/2 in. maximum and 31 1/2 in. minimum. The line from which to measure has been determined by the Interstate Commerce Commission as the center line of the shank of couplers. It may, therefore, happen that a high car with its center line of drawbar 34 1/2 in. above the rail, may have a head which is raised so that the knuckle extends 6 in. above the center line and 3 in. below. And to this may be coupled a low car with the head of the coupler dropped so that the knuckle extends 6 in. below the center line and 3 in. above. Thus the contact faces of the couplers in actual engagement may be limited to one lug of each knuckle, and instead of being 6 in., as is intended by the law, they are reduced to 3 in., and so very liable to jump past each other on rough track.

(F) It is recommended that the present gage for new knuckles be used on all knuckles purchased separately for renewals. No change is recommended in this gage.

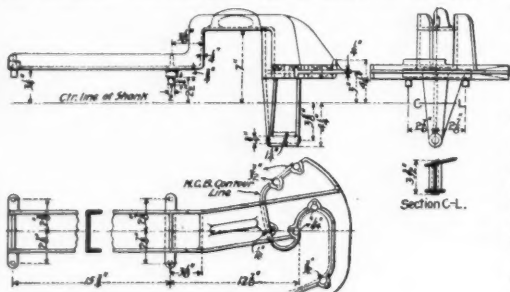


Fig. 11.—Twist Gage.

(G) It is recommended that the vertical height of the stop shoulder or horn of the coupler be not less than 3 1/2 in., and that the horn be arranged to touch the striking plate before the back of the head of the coupler strikes the ends of the draft timbers. There is at present no uniformity in this dimension.

2. To define the contour lines more fully when worn. This takes in the subject of gages for worn couplers, and it is recommended that the gage shown in Fig. 43 be used. These gages are cheaply made of sheet metal stampings, and it is earnestly recommended that they be immediately put into use at all interchange points,

and that the same care be given to the examination of couplers as is given to any other portion of the car. We have no doubt the use of this gage will put a stop to a large percentage of the instances of trains parting on the road without couplers unlocking. If this gage passes through a coupler with any slide out the coupler must be repaired; or, if it passes when the cam lever is moved from A to B and all the slides are thrown part way out. This latter movement is provided to cover a combination of wear of several parts which would not be detected by each slide separately, but would be sufficient to allow couplers to part without the knuckles opening.

3. To propose specifications for couplers. This part of the subject has received very careful consideration. It has been difficult to reconcile the diametrically opposite opinions which have been expressed by various railroad men and coupler makers. It is believed, however, that rigid specifications and tests will do much to weed out the poorer makes of couplers at present being furnished, and it is recommended that in the future all couplers be purchased subject to the provisions of the following standard specifications and tests.

#### Specifications for M. C. B. Couplers.

After September 1, 1899, all M. C. B. automatic car couplers purchased by or used in the construction of cars for the above-named company must meet the requirements of the following specifications.

Couplers must conform to M. C. B. contour lines, dimensions and gages. They must couple and uncouple with each other (with either or both knuckles open) and with the master or sample coupler. They should unlock easily, and should lock with freedom when the knuckle is pushed in by hand. They must have complete locking fixtures.

They must have steel pivot pins 1 1/2 or 1 3/4 in. in diameter, and of a uniform length of 13 1/2 in. from the under side of head to the center of pin hole for 3/4-in. cotter. Pivot pins, after being heated and having the head struck up, must be carefully and properly annealed.

The hole for pivot pin in bar or knuckle should be drilled (or, if cored, must be drilled out) so as not to be more than 1/16-in. larger than the pin. The hole to be parallel with the face of the bar or knuckle and at right angles to the axis of the bar or knuckle.

Knuckles must conform closely to dimensions and fit neatly in coupler head, so that the contour will conform strictly to M. C. B. gages. They will not be accepted if distorted by improperly matched flasks or any other defects caused by molding, and must be free from shrinkage cracks, flaws and checks, and sand, scale or blow holes. The coupling pin hole must not be less than 19/16 in. nor more than 1 1/4 in. in diameter, and must be parallel with the face of knuckle and at right angles with the axis of the knuckle.

The name of the coupler and class of bar must be cast upon the top side of head of bar in letters and figures 3/4-in. long and raised 1/16-in. Each drawbar must also have the maker's mark and date of manufacture plainly cast or stamped upon it at some point where they will not wear off. Each knuckle must have the serial number of class or style and maker's mark either cast or stamped upon it at some point where it will not be worn off.

As many drawbars and knuckles as possible must be cast from each heat of steel or melt of iron used. All parts to be well annealed throughout.

Couplers and parts will be submitted to the following five distinct tests:

#### 1. Striking test on closed knuckles of complete coupler.

Coupler to be held in machine so that the axis of the coupler is in the center line of drop, and the axis of the coupling pin hole passes through the center lines of the legs of the machine and the shank of the coupler rests solidly on the anvil. Blows to strike directly on knuckle.

Three blows of 1,640 lbs. weight falling 5 ft.

Three " " 1,640 " " " 10 "

A coupler will be considered as having failed to stand this test when it is broken before it has received three blows at 5 ft. and three blows at 10 ft., or when any cracks appear more than 1 in. long or open more than 1/16-in., or when the center line of the shank is distorted more than 1 in. from its original position, or when the knuckle is found to have closed more than 3/4-in. from its original position when pulled out against the lock after having received the three blows at 5 ft.

#### 2. Jerk test of complete couplers.

Two couplers to be supported in the machine by the yoke forgings and draft springs provided. Blows to strike directly on the equalizer bar connecting the two couplers and resting on their closed knuckles.

Three blows of 1,640 lbs. weight falling 5 ft.

Three " " 1,640 " " " 10 "

A coupler will be considered as having failed to stand this test when it is broken before it has received three blows at 5 ft. and three blows at 10 ft., or when any cracks appear more than 1 in. long or open more than 1/16-in., or when the knuckle has opened more than 1/2-in. from its original position or so that the equalizer bar will not stay in place when struck.

#### 3. Pulling test for complete couplers.

Two couplers to be supported in the pulling machine by yoke forgings, to be locked together as in the running position, with their axes in the same straight line.

Couplers to stand a steady pull of 120,000 lbs. If fitted with steel knuckle and 85,000 lbs. if fitted with wrought-iron knuckle.

A coupler will be considered as having failed to stand this test when it is broken before it has been pulled the prescribed number of pounds, or when any cracks appear more than 1 in. long or open more than 1/16-in., or when the knuckle is found to have opened more than 3/4-in. from its original position when pulled out against the lock, or when the couplers slip apart in the pulling machine.

In case of the failure of any part of the complete coupler under tests 1, 2 and 3, those parts which may not have failed may be submitted for a future test, providing such parts shall not be condemned by the individual tests hereinafter specified.

#### 4. Guard arm test of drawbar.

Drawbar to be held vertically in the machine so that the edge of the guard arm is in the line connecting the centers of the legs of the machine, and so that the shank rests solidly on the anvil. Blows to strike directly on the edge of the guard arm.

#### For Malleable Iron Couplers.

Three blows of 1,640 lbs. weight falling 3 ft.

Two " " 1,640 " " " 5 "

#### For Steel Couplers.

Three blows of 1,640 lbs. weight falling 3 ft.

Four " " 1,640 " " " 5 "

A drawbar will be considered as having failed to stand this test when it is broken before it has received the prescribed number of blows, or when any cracks appear more than 1 in.

long or open more than 1/16-in., or when the center line of shank is distorted more than 1 in. from its original position, or when the head is distorted sufficiently to allow the hammer to hit on the face of the bar, or the lugs of the bar to strike against the hammer.

#### 5. Separate knuckle test.

Knuckle to be laid horizontally on one of its lugs, upon a

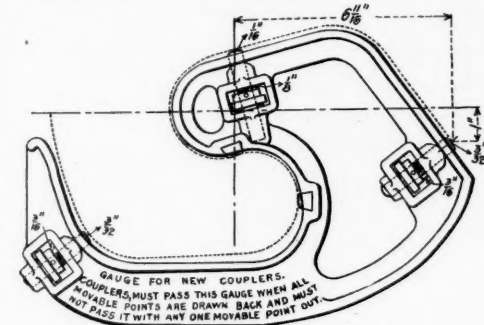


Fig. 3.—New Gage for New Couplers.

solid anvil, and given the following blows upon the top of one lug:

Knuckles pivoted 2 in. or less from center of pivot pin hole to face of knuckle to stand—

Three blows of 1,640 lbs. weight falling 3 ft.

One " " 1,640 " " " 4 "

Knuckle pivoted 3 in. or less from center of pivot pin hole to face of knuckle to stand—

Three blows of 1,640 lbs. weight falling 3 ft.

Two " " 1,640 " " " 4 "

Knuckles pivoted over 3 in. from center of pivot pin hole to face of knuckle to stand—

Three blows of 1,640 lbs. weight falling 3 ft.

Three " " 1,640 " " " 4 "

A knuckle will be considered as having failed to stand this test when it is broken before receiving the proper number of blows, or when any cracks appear more than 1 in. long or open more than 1/16-in.

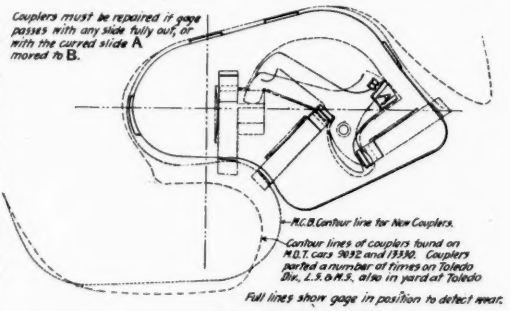


Fig. 43.—Gage for Worn Couplers.

At the end of all the above tests, except No. 5, couplers will be tried for disassembly. Knuckles must open and locking devices be operative after the coupler has received the specified test. Before testing, couplers must have a row of center-punch marks put upon the center line of top of shank, so distortion can be detected.

Couplers will be chosen for test as follows:

One complete coupler shall be taken at random by the inspector from each lot of 100 couplers offered for test. The pivot pin and locking parts may be returned to the manufacturer. The knuckle will be tested as in test No. 5 and the drawbar will be subjected to the guard-arm test as in No. 4. If the test part fails to stand the prescribed test, a second coupler will be taken from the same lot from which the first test part was taken, and if it stands the test and if at the same time the first part tested has attained an average of 75 per cent. on the basis of 100 per cent. as meeting the full requirements, then the lot will be accepted; but if the second part fails to stand the test, then the lot will be rejected. For each 1,000 couplers offered, or fraction order, five com-

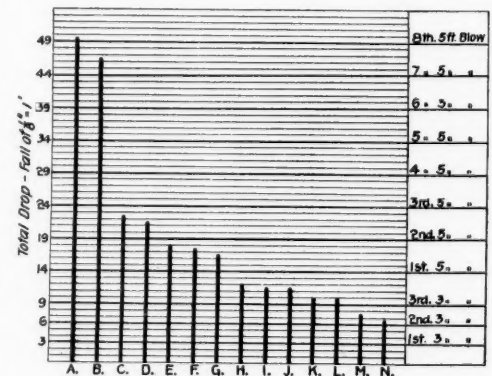


Fig. 64.—Guard Arm Tests—Averages of Blows.

A Chicago.  
B Munton.  
C S. H. & H.  
D Janney.  
E Hen. Mal. I.  
F Tower.  
G Hen. Steel.

H Gould.  
I Mo. Pac.  
J Buckeye.  
K American.  
L Trojan.  
M Standard.  
N Lone Star.

plete couplers shall be taken at random by the inspector. One shall be submitted to the striking test, No. 1; two to the jerk test, No. 2, and two to the pulling test, No. 3. If any coupler should fail to stand the prescribed test, another coupler or pair of couplers will be taken from the same lot from which the first test couplers were taken, and if it stands the test, and if at the same time the first tested has attained an average of 75 per cent. on the basis of 100 per cent. as meeting the full requirements, then the lot will be accepted; but if the second coupler fails to stand the test, then the lot will be rejected.

All drop tests shall be made on an M. C. B. standard drop

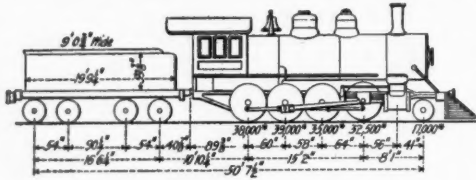




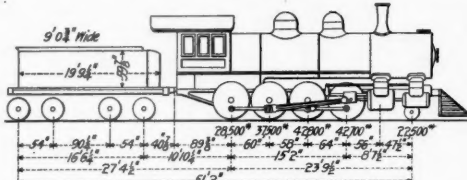
trusting that, if adopted, the loyalty of the members would induce them to prefer these sizes to any others in all new work hereafter.

Second, to choose such sizes that would be most generally suitable for the repairs of the great majority of the cars now in service.

In preparing the circular of inquiry the committee did not think it advisable to consider any cars below 50,000 lbs. capacity, less than 32 ft. in length, or of special construction. The railroads that have replied



Simple Consolidation Locomotive—A. T. & S. F. Ry.



Tandem Compound Consolidation—A. T. & S. F. Ry.

to the committee's circular represent a total of 853,014 cars of 50,000 lbs. capacity and over, out of a total of 1,252,219 cars. As the result the committee feels justified in recommending the following finished sizes for sections of longitudinal car sills:

For cars such as box, stock, flat, long gondolas, refrigerators, etc., 32 ft. and over in length, but under 40 ft.

Inches.	Inches.	Inches.	Inches.
4 by 8	4 by 9	4 by 10	4 by 12
4 1/2 by 8	4 1/2 by 9	4 1/2 by 10	4 1/2 by 12
5 by 8	5 by 9	5 by 10	5 by 14

For cars 40 ft. long and over, such as furniture and special long gondolas:

Inches.	Inches.	Inches.	Inches.
4 1/2 by 8	4 1/2 by 9	6 by 9	6 by 12
5 by 8	5 by 9	6 by 10	6 by 14
	5 by 10		

It is believed that the above recommendations afford a sufficient range of sizes to cover all requirements of design; they are good merchantable sizes, and if adopted and used as suggested, we may expect that car repairs will be greatly expedited, as there will be less delay in getting special sizes of lumber, and we will be able to get our requisitions for regular sizes filled more promptly, as the lumbermen can saw in advance of orders with a reasonable certainty of selling their stock.

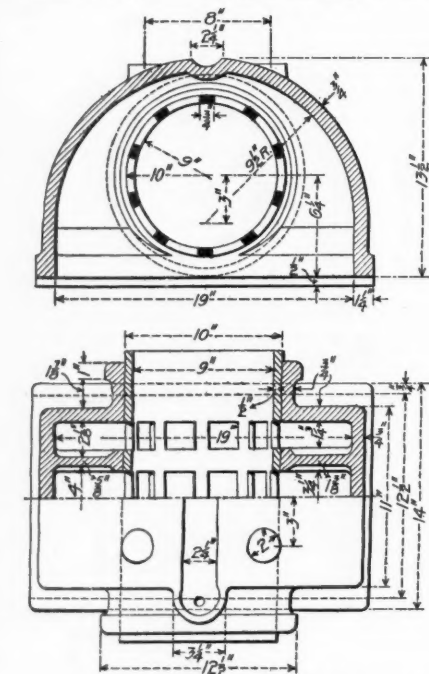
To further expedite the general introduction of standard sizes for car sills to facilitate car repairs, and reduce stocks of lumber, it is further recommended that the following paragraph be introduced into the Master Car Builders' Rules of Interchange, to follow Section 3 of Rule 4:

"When renewing long sills in foreign cars requiring odd sizes of lumber, the next larger suitable M. C. B. standard size of sill may be used and considered as proper repairs."

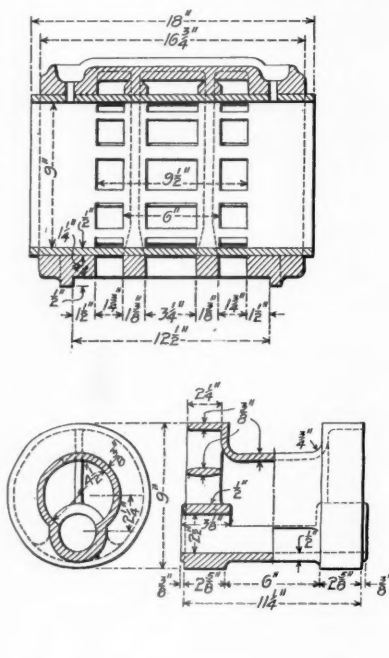
The report is signed by R. P. C. Sanderson, J. S. Lentz and N. Frey.

#### Height of Couplers.

The Committee on Height of Couplers has decided not to confer with the American Railway Association and the Interstate Commerce Commission, to get the limits of height of couplers changed to 31 in. minimum, and 35 in. maximum.



Details of Low-Pressure Piston Valve and Cage, Tandem Compound.



Details of High-Pressure Piston Valve, Tandem Compound.

With knuckles divided in the center by the slot for coupling link, any increase in the limits for height of couplers will result, in many cases, of only one knuckle lug of each coupler being in contact. Any increase in the limits of height of couplers will tend

toward a greater number of trains parting, due to one coupler passing over the other. The committee's decision is based on these two facts. For some time to come there will be a number of link-and-pin couplers in service, and for this reason it is not advisable to make any recommendations toward closing the slot in the knuckle. The committee thinks that after January 1, 1900, will be time enough for the Master Car Builders' Association to take up the matter with the view of closing the slot in the

knuckle, and at that time any increase in the limits for height of couplers should be considered. This report is signed by S. Higgins, J. H. McConnell and C. M. Mendenhall.

#### The Simple and Compound Consolidation Locomotives of the Atchison, Topeka and Santa Fe.

[WITH AN INSET.]

In 1896 concentration of motive power, to a greater extent than had previously been attempted on the

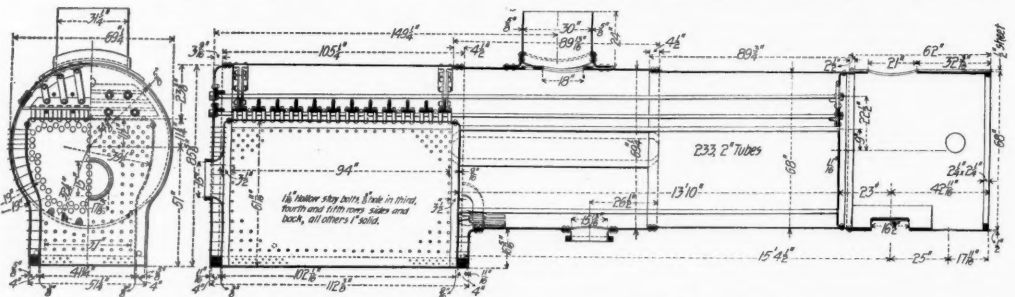


Fig. 2.—Boiler of Simple Consolidation Locomotive—A. T. & S. F. Ry.

Atchison, Topeka & Santa Fé, was a subject for immediate consideration by the officials of that road; and the same year the design of a consolidation locomotive suitable for heavy service in mountainous districts was made by Mr. John Player, Superintendent of Machinery. In April, 1897, the first engine built according to this design was completed at the company's shops at Topeka and assigned to duty on the New Mexico Division, between La Junta, Colorado, and Raton, New Mexico, under the supervision of Mr. C. M. Taylor, Division Master Mechanic. In rapid succession three additional locomotives of the same type were built at Topeka and, likewise, assigned to that part of the system which is gridironed by outlying ridges of the Rocky Mountains.

The possibility for a complete revision and increase of tonnage rating, as established previously to

engravings. It may be noted that the simple engines built since August last have cabs and running boards of steel; previous to that time wooden cabs were used, as shown by the line drawings.

In explanation of the other engravings, it may be said that Figs. 1-B to 1-E, inclusive, show the cylinders and front truck of the tandem compound; Fig. 2 the boiler of the simple engine, which is practically the same as that of the compound, and Fig. 2-A the front end arrangement of the compound. Figs. 3 and 3-A show the details of the frames, and Fig. 4 the cylinder and valve arrangement of the compound. Beside these, numerous details are illustrated and referred to by title only. Figs. 5 to 8 relate to tables and engravings shown in connection with the results of the road tests of the tandem compound, and a Class C-17 simple engine, No. 937, built by the Baldwin Locomotive Works.

All the engravings showing the details of the locomotives (except Figs. 2, 3 and 3A) that have been given a figure number, with a few showing the more important parts, are illustrated on the inset in this issue.

The novel features of the simple engine are the cast steel expansion plate and bracket from the

throat sheet to the frames, and the frames themselves, which are also of cast steel; both are shown by detail drawings.

The cylinders of the tandem compound are placed in the usual order for this type of engine. The high-pressure, 15-in. cylinders are in front; and the low-pressure, 25-in. cylinders are cast with an independent saddle which is placed in the rear of the saddle carrying the high-pressure cylinders. The ratio of







1 1/2 in. by 16 in. Both valves have a total length of 11 1/4 in. The high-pressure valves have 3/8 in. inside clearance and the low-pressure valves are line and line inside; all valves have 3/4 in. outside lap and 1/2 in. lead in full gear, with 6 1/2 in. maximum travel. The most striking feature is that the valves have no packing rings of any description. They are simply plain pistons made of good valve metal and on each surface that comes in contact with the bushing there are four small oil or steam grooves that encircle the valve. The wear of these valves in three months of constant service has been so slight that no change

Diameter of truck wheels	33 in.
Diameter and length of axle journals	4 1/4 x 8 in.
Distance between centers of journals	75 in.
Diameter of wheel flange on axle	5 5/8 in.
Diameter of center of axle	4 1/2 in.
Type of truck bolster	Player.
Type of truck transom	Channel.
Length of tender frame over bumpers	21 ft. 4 1/2 in.
Length of tank	19 ft. 8 1/4 in.
Width of tank	9 ft. 0 1/2 in.
Height of tank, not including collar	4 ft. 11 3/4 in.
Height of tank over collar	5 ft. 4 in.
Type of back drawhead	Trojan.
With or without waterscoop	Without.

## Names of Makers of Special Equipment.

Tires	Midvale Steel Co.
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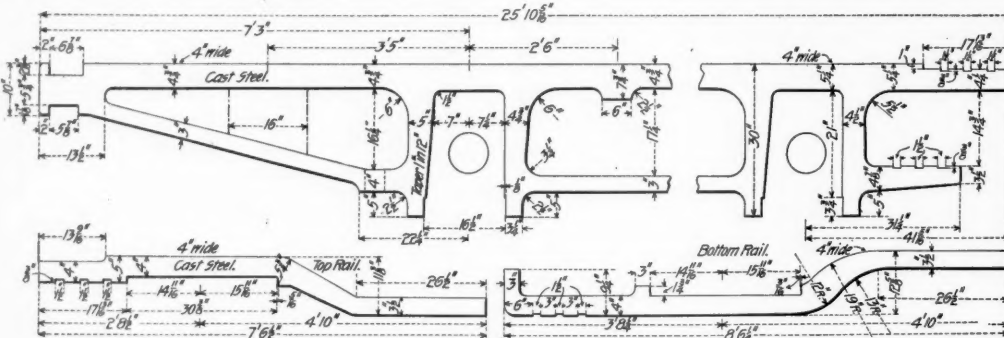


Fig. 3.—Cast Steel Frames for Simple Consolidation Locomotive.

in dimensions can be noticed. The balance of the valves is so well established that the reverse lever may safely be unlatched and held between the thumb and finger, at any point within the ordinary working range of the lever. The indications are that valves made in this way will wear at least from five to eight months without renewal and without any important leakage of steam.

The principal dimensions of the simple and compound consolidation locomotives described above are as follows:

	SIMPLE.	COMPOUND.
Type	Consolidation.	Consolidation.
Name or number	937	999
Name of builder	Baldwin	A. T. & S. F.
Gage	4 ft. 8 1/2 in.	4 ft. 8 1/2 in.
Kind of fuel to be used	Bituminous Coal.	Bituminous Coal.
Weight on drivers	144,500 lbs.	151,500 lbs.
" truck wheels	17,000 lbs.	22,500 lbs.
" total	161,500 lbs.	174,000 lbs.
Tender loaded	90,000 lbs.	90,000 lbs.
Wheel base, total, of engine	23 ft. 3 in.	23 ft. 9 1/2 in.
" driving	15 ft. 2 in.	15 ft. 2 in.
" total (engine and tender)	50 ft. 7 1/2 in.	51 ft. 2 in.
Length over all, engine	38 ft. 6 1/2 in.	39 ft. 2 in.
" total, engine and tender	61 ft. 9 in.	64 ft. 1 1/2 in.
Height, center of boiler above rails	8 ft. 2 1/2 in.	15 ft.
Heating surface, firebox	1,076 sq. ft.	1,647 sq. ft.
" tubes	1,841 sq. ft.	1,812 sq. ft.
" total	2,917 sq. ft.	3,459 sq. ft.
Grate, area	20.2 sq. ft.	18.95 sq. ft.
Drivers, diameter	30 in.	36 in.
" material of centers	Cast steel.	Cast steel.
Truck wheels, diameter	30 in.	36 in.
Journals, driving axle, diameter	8 in.	8 1/2 in.
" truck	6 1/2 in.	6 1/2 in.
Main crank pin, diameter	21 in.	15 and 25 in.
Cylinders, diameter	21 in.	15 and 25 in.
Piston, stroke	28 in.	3 and 4 in.
" rod, diameter	4 in.	3 and 4 in.
Kind of piston rod packing	Metall.	Metall.
Main rod, length center to center	10 ft. 3 3/4 in.	10 ft. 3 3/4 in.
Steam ports, length	18 in.	18 in.
" width	1 1/2 in.	1 1/2 in.
Exhaust ports, length	18 in.	18 in.
" width	3 in.	3 in.
Bridge, width	3 in.	3 in.
Valves, kind of	Balance	Piston with
" greatest travel	5 1/2 in.	6 1/2 in.
" outside lap	3/4 in.	3/4 in.
" inside lap or clearance	0 in.	1/2 in.
lead in full gear	1/2 in.	1/2 in.
Boiler, type of	Straight.	Straight.
" working steam pressure	180 lbs.	180 lbs.
" material in barrel	Carbon steel.	Carbon steel.
" thickness of material in barrel	3/8 in.	3/8 in.
diameter of barrel, outside	68 in.	68 in.
Seams, kind of horizontal	Butt joint, sextuple riveted.	Lap joint, double riveted.
" circumferential	Lap joint, double riveted.	Lap joint, double riveted.
Thickness of tube sheets	Front 1 1/2 in., Back 1 1/2 in.	Front 1 1/2 in., Back 1 1/2 in.
Crown sheet stayed with	Crown bars and sling stays.	Crown bars and sling stays.
Dome, diameter	30 in.	30 in.
Firebox, length	8 ft. 6 in.	8 ft. 6 in.
" width	3 ft. 5 1/4 in.	3 ft. 5 1/4 in.
" depth front	62 1/4 in.	62 1/4 in.
" back	62 1/4 in.	62 1/4 in.
" material	Steel.	Steel.
thickness of sheets	3/8 in.	3/8 in.
brick arch	3/8 in.	3/8 in.
water space, width	Front, 4 in.; Sides, 4 in.; Back, 4 in.	Front, 4 in.; Sides, 4 in.; Back, 4 in.
Grate, kind of	Finger.	Rocking.
Tubes, number	242	238
" material	Charcoal iron.	Charcoal iron.
" outside diameter	2 in.	2 in.
" length over sheets	13 ft. 10 in.	13 ft. 10 in.
Smokebox, diameter inside	68 in.	68 in.
" length	63 1/2 in.	63 1/2 in.
Exhaust, nozzle	Single.	Single.
" diameter	4 1/2 in.	4 1/2 in.
" distance of tip below center of boiler	1 1/2 in.	1 1/2 in.
Netting	Wire	Wire
" size of mesh	1/4 x 1/4 in.	1/4 x 1/4 in.
Stack	Taper.	Taper.
" least diameter	13 in.	13 in.
" greatest diameter	14 1/2 in.	14 1/2 in.
" height above smokebox	3 ft. 11 in.	3 ft. 11 in.

Type	Swivel trucks.
Tank capacity for water	5,000 gals.
Coal capacity	6 1/2 tons without boards.
Kind of material in tank	Steel.
Thickness of tank sheets	3/4 in.
Type of under-frame	Steel.
Type of truck	Arch bar.
Truck with	Rigid bolster.
Type of truck spring	Elliptic.

Sight-feed lubricators	Nathan Mfg. Co.
Front and back couplers	Trojan Car Coupler Co.
Safety valve	Crosby Steam Gage & Valve Co.
Sanding devices	Houston.
Injector	Nathan Mfg. Co.
Driver brake equipment	American Brake Co.
Tender brake beam	Westinghouse.
Tender brake shoe	Player.
Driver brake shoe	A. T. & S. F.
Air pump	A. T. & S. F.
Steam gages	Westinghouse.
Air Brake Attachment	Crosby Steam Gage & Valve Co.

## The Test.

The record of the performance of the simple and compound engines has extended over a much longer period than might be inferred from the dates and data appearing upon the performance sheet, Fig. 7. The results obtained are for this reason of greater value than they might have been, had the test been one of short duration. The work in connection with matters of a similar nature has in reality extended over several months.

In the final preparations for the test both engines were put in as nearly normal condition as possible, engine No. 999 having been out of the shop about ten months, and engine No. 937 four months. The work of equipping and testing the locomotives was assigned to Mr. Robert F. Hoffman, who conducted the tests throughout and made the observations. We are informed that the instructions issued by the Superintendent of Machinery were to test the engines absolutely without favor or prejudice, but in cases of doubt such as may arise in road tests to cast the balance against the record of the compound engine. This, it is stated, has been the method followed with a view to rendering doubly certain the value of any percentage which might show to the credit of the compound engine. From the methods and apparatus used it is safe to say that this test has been as accurately made as it is possible to make a service test.

Coal was weighed to the engines in sufficient quantity to insure running over the division without further supply. The coal remaining on the tenders at division terminals was carefully weighed off and recorded. Water was measured by known marks previously established by weighing stated volumes of water drawn from the tender. The equipment for testing consisted of Crosby steam indicators, a Queen

near the center of the boiler. Thus located and closely covered by the diaphragm plate, the purpose of obtaining the extreme register of escaping gases was doubtless attained. The vacuum gage consisted of a U-shaped glass tube, whose inside diameter was duplicated in the inside diameter of a brass plug tapped into and extending just through the smoke box. It was located at the middle of the smoke box both horizontally and vertically. A rubber connection was made between the glass tube and the plug opening into the smoke box, and a plain plug valve was interposed between the smoke box opening and the opening of the tube to the atmosphere. In the shut-off plug and its shell two small pin holes were drilled in such relation that when the opening into the smoke box was closed a direct atmospheric pressure was brought to bear upon the water arms of the vacuum gage, in this manner restoring the water to its normal level when desired for the purpose of checking results. It is generally conceded that the location of the instrument as described would record the greatest vacuum in any portion of the smoke box, and this location was therefore chosen. Speed was recorded by a careful count of the revolutions of the driving wheels. Assisting in the work, when indicator cards were taken, were Messrs. John McLearn, William B. Thomson and Frank C. Farquharson, all connected with the shops and offices at Raton.

As outlining the nature of the work done by the Class C-17 engines it should be said that at a distance of 98 miles west of La Junta the summit of Raton Pass is reached, at an elevation of 7,529 ft. above the sea level. This is the elevation given for Lynn, a passing point for trains, at the western end of the tunnel. The actual summit is at a point about 200 ft. within the tunnel and east of Lynn, the elevation there being perhaps 5 ft. greater. From Trinidad to Lynn, 26.5 miles, the increase in elevation is 1,548 ft. In this portion of the road the maximum curvature is 10 degrees and the maximum grade is 185 ft. per mile. Upon the western side of the Raton Mountain, working eastward from Raton to Lynn, the rise is 893 ft. in a distance of 6.5 miles, with a maximum grade of 175 ft. per mile and a maximum curvature of 10 deg.

At Glorieta, 165.9 miles south of Raton, the summit of the second range of mountains is crossed. The elevation at that point is approximately 170 ft. less than the total altitude of Raton Mountain. The most difficult portions of this territory lie between Morley and Lynn, upon the east side of Raton Mountain, and in the approach to Glorieta upon the second range of mountains. Between La Junta, Colorado, and Albuquerque, New Mexico, the sum of ascents is, by close approximation, 8,440 ft. going westward and 7,551 ft. going eastward. The maximum grade in feet per mile is 185 westward and 175 eastward, with a maximum curvature of 10 deg. The compound engine No. 999 was used on a run which necessitated its passing to and fro over Raton Mountain, thus demonstrating its fitness for ascending and descending steep grades. Finally, in the test for record, the engine was dispatched between Raton and Las Vegas, as stated in the following paragraph, where, between Colmor and Levy, there is a steady ascent of nine miles of heavy grade going westward.

The western portion of the New Mexico Division from Raton to Las Vegas, a distance of 110.8 miles, was chosen for the testing ground, there being a more nearly equal sum of ascents in both directions than could be readily found elsewhere. The sum of ascents westward is 2,074.05 ft. and eastward 2,312.01 ft. The maximum grade in feet per mile westward is 69.7 and eastward 70.7. The maximum curvature is 6 deg. and 10 min., and the total curvature for the 110.8 miles is 2,719 deg. and 13 min.

During the test, a single engineman was regularly

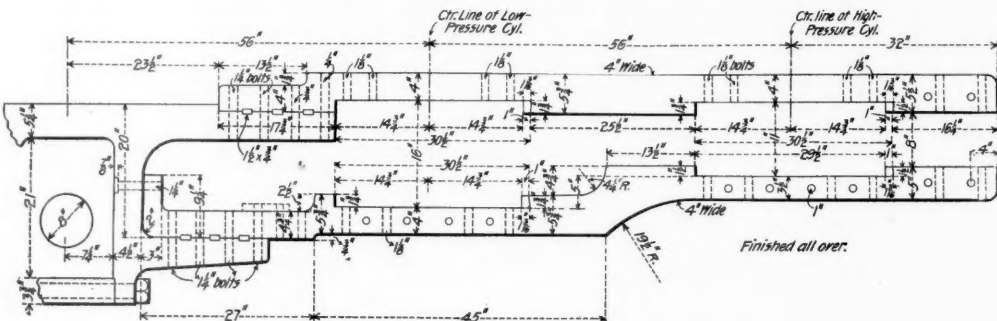


Fig. 3A.—Front Frame of Tandem Compound.

& Co. columnar mercurial pyrometer, a water-column vacuum gage with water maintained as nearly as possible at 65° F., and other devices necessary for recording throttle opening in fractions of an inch, and the cut-off of steam in the cylinders. The indicators were used in pairs upon the compound engine, both instruments being connected to the same rig. The pyrometer was set at an angle in the smoke box that caused the instrument to strike a downward diagonal line of about 45° to a horizontal line and close in front of the flues, extending to a point

assigned to run the two engines in turn. Mr. Charles E. Donnelly was selected as one of the best of many expert enginemen employed in mountain service. To remove as largely as possible the question of skill in firing the engines, the work of firing was divided into periods, with four men employed at different times. These firemen were Messrs. Lee Boyd, A. A. McPheeters, A. D. Gaston and W. H. Carlow, all men of known ability. On trips with the compound Nos. 1, 2, 3 and 4, Boyd was the fireman; on trips 5 and 6, Carlow, and on trips 7 to 12 inclusive, McPheeters.



FIG. 7.—RESULTS OF COMPARATIVE TESTS BETWEEN SIMPLE AND COMPOUND CONSOLIDATION LOCOMOTIVES.  
Note.—High pressure valves, at full gear, on all trips, unless otherwise noted.

Date.	Train number.	Trip number.	New Mexico Division (110.8 miles.)	Water.		*Coal, Pounds used.	Cars.			Tons per train.	Gallons water used per ton of train.	Lbs. coal used per ton of train.	Lbs. coal used per gal. water.	Lbs. w'r evapor. per lb. coal.	Actual running time, hrs. min.	Actual time on road hrs. min.	Aver. steam pressure, lbs.	Aver. temp. of water in tank, degs.	Aver. temp. of atmos- phere, degs.	Aver. speed, miles per hour	Remarks.
				Gallons used.	Pounds used.		Aver. No. loaded.	Aver. No. empties.	Average No. cars.												
Compound Locomotive, No. 999.																					
4-6-99	1st 33	1	Raton to Vegas	8,855	74,382	11,889	28	1	29	792.5	11.17	15.00	1.34	6.25	5:36	6:12	170	40	45	19.74	Fair; light breeze opposed on left quarter.
4-7-99	1st 34	2	Vegas to Raton	7,424	62,353	9,621	18	1	19	594.0	12.49	16.19	1.29	6.48	4:41	6:29	170	40	45	23.22	Clear; still; frosty to Tipton. 10-mile wind opposed right quarter to Raton.
4-8-99	1st 33	3	Raton to Vegas	8,809	73,906	11,523	28	1	29	800.0	11.01	14.40	1.31	6.42	5:10	6:04	175	40	45	19.50	Fair; 10-mile wind opposed left quarter.
4-9-99	1st 34	4	Vegas to Raton	9,291	77,288	11,101	24	1	25	790.0	11.61	14.05	1.26	6.96	5:22	6:39	170	42	55	20.64	Fair; 20-mile wind opposed right quarter and head.
4-10-99	1st 33	5	Raton to Vegas	8,732	73,349	12,240	28	1	29	794.0	10.99	15.41	1.40	5.99	5:37	6:05	175	44	45	19.68	Fair; 20-mile wind, right side, to Springer; 10-mile wind, right side, to Vegas.
4-11-99	1st 34	6	Vegas to Raton	9,393	78,901	11,627	24	1	25	816.0	11.51	14.24	1.23	6.78	5:16	6:55	175	45	55	19.20	Fair; 10-mile wind, right side.
4-12-99	2d 35	7	Raton to Vegas	9,758	81,967	11,756	27	1	28	844.0	12.3	11.62	1.20	6.97	6:24	8:27	175	45	50	17.34	Fair; 25-mile head wind to Wagon Mound.
4-13-99	Extra.	8	Vegas to Raton	6,686	56,162	8,362	14	1	15	491.0	13.61	17.03	1.25	6.71	4:37	6:35	170	45	55	24.06	High pressure valves at mid-gear. Fair; 20-mile wind, left side.
4-14-99	1st 33	9	Raton to Vegas	9,842	82,673	13,552	27	1	28	791.0	12.44	17.13	1.37	6.10	5:19	8:38	170	42	40	18.51	Fair; still to Wagon Mound; 10-mile head wind to Vegas.
4-14-99	1st 34	10	Vegas to Raton	10,474	87,972	13,627	26	1	27	816.0	12.83	15.47	1.20	6.96	6:29	8:28	167	45	65	17.04	Fair; 10-mile head wind.
4-15-99	1st 33	11	Raton to Vegas	10,239	86,008	14,216	28	1	29	804.5	12.72	17.67	1.38	6.05	6:46	8:04	170	45	10	17.22	Fair; 15-mile wind, head and right quarter.
4-16-99	1st 34	12	Vegas to Raton	8,191	68,801	9,311	17	3	20	614.0	13.34	15.19	1.14	7.37	5:45	8:01	160	42	5	19.26	Fair; assisting 10-mile wind to Wagon Mound; 30-mile side wind, left, to Raton. High pressure valves at mid gear.
Average totals.....				8,967	75,321	11,487	24	1.16	25.2	742.2	12.08	15.47	1.28	6.55	5:42	7:10	.....	.....	.....	19.42	
Simple Locomotive, No. 937.																					
5-16-99	Extra	1	Raton to Vegas	1,232	91,349	16,052	15	16	32	778.0	14.43	20.63	1.43	5.87	5:47	11:47	180	45	55	19.15	Fair; 10-mile wind, right side.
5-17-99	1st 34	2	Vegas to Raton	1,328	86,755	13,087	15	18	33	807.0	12.79	16.21	1.26	6.62	6:05	6:56	184	45	57	18.19	Fair; assisting wind to rear, 15 miles per hour.
5-18-99	Extra	3	Raton to Vegas	13,617	114,383	17,880	17	16	33	800.5	17.01	22.33	1.31	6.39	6:33	12:55	180	51	65	16.92	Fair; 30-mile wind right side, to Shoemaker; still to Vegas.
5-19-99	1st 34	4	Vegas to Raton	9,729	81,724	13,143	22	1	23	768.0	12.66	17.11	1.35	5.21	5:59	8:00	180	55	65	18.53	Fair; 30-mile wind, assisting to Wagon Mound; breeze assisting to Raton
5-20-99	1st 33	5	Raton to Vegas	11,947	100,355	16,308	30	1	31	802.0	14.89	20.33	1.36	6.15	6:27	9:03	175	48	50	17.17	Fair; still to Wagon Mound; 15-mile wind opposing right quarter to Vegas.
5-20-99	1st 34	6	Vegas to Raton	10,052	84,437	12,392	22	3	25	793.0	12.67	15.60	1.23	6.81	5:38	6:16	180	54	50	9.66	Fair; 50-mile wind assisting on left quarter to Col-mor; breeze to Raton.
5-22-99	1st 33	7	Raton to Vegas	11,530	96,852	16,927	28	2	30	797.0	14.46	21.23	1.46	5.72	5:14	11:04	170	54	70	19.10	Fair; still to Springer; 10-mile wind on right side to Vegas.
5-22-99	2d 34	8	Vegas to Raton	10,306	86,570	14,078	24	1	25	809.0	12.73	17.40	1.34	6.11	5:26	7:22	175	53	56	20.38	Fair; 10-mile wind assisting to Wagon Mound; still to Raton.
Average totals				11,093	93,178	14,983	21.7	7	22.9	794.3	13.95	18.88	1.34	6.24	5:58	9:04	.....	.....	.....	18.63	
Percentage in favor of Compound.....				.....	.....	.....	.....	.....	.....	.....	13.44	18.6%	4	4%	4.9%	.....	.....	.....	.....	.....	

\* Blossburg Mine Run Coal used on all trips.

Engine 999 (Compound).

Tandem four-cylinder type; cylinders, 15 and 25x28 in.; weight on drivers, 151,500 lbs.; grate surface, 18.9 sq. ft.; heating surface, 1,811.63 sq. ft.; driving wheels, 57 in.; steam pressure, 180 lbs.; nozzle tip, 1 1/2 in. Valves: high pressure, 3/4 in., O.S. lap; 3/4 in., inside clearance; low pressure, 7/8 in., O.S. lap; line and line inside; travel in full gear, all valves 5/8 in.

Engine 937 (Simple).

Cylinders, 21x28 in.; weight on drivers 143,500 lbs.; grate surface, 23.2 sq. ft.; heating surface 1,840.6 sq. ft.; driving wheels 57 in.; steam pressure, 180 lbs.; nozzle tip, 4 1/2 in. on trips 1 to 6 inclusive, 4 1/2 in. on trips 7 and 8. Valves: 3/4 in. O.S. lap; line and line inside; travel, 5 in.; lead in full gear, 1/8 in.

Carlow was fireman on trips 1, 2, 3 and 4 of the test of the simple engine; Gaston on trips 5 and 6, and McPheeters fired on trips 7 and 8. As stated, a single engineman made all the test runs.

Notes as to the climatic conditions during the tests are given as marginal notes to the table, Fig. 7. It should also be mentioned that while the same kind of coal was used on all the trips, namely, Blossburg mine run, the quality varied. In test No. 3 of the compound the coal was about 50 per cent. slack, while in tests No. 6, 7 and 12 of the compound and all of the tests of the simple engine the coal was of an average quality of mine run; in the other tests the coal was good.

#### Results and Observations.

The results obtained in the tests, as shown in Fig. 7, both for the fuel and water used and the evaporation per unit of coal are exceptionally good. Savings of 13.4 per cent. in water and 18 per cent. in coal are larger than might be expected from a compound locomotive doing work of this character. The amount of coal used per ton of train, and the number of cars hauled when weather conditions are considered is a performance which would be creditable to any locomotive worked in a mountainous district subject to strong winds. The tonnage shown on the performance sheet is the tonnage of trains hauled exclusive of the weight of the engine and tender, but including the weight of the caboose.

The steam distribution shown by the indicator diagrams from both the simple and the compound engine furnishes little cause for cavil. The diagrams as a whole are much above the average of those published from time to time. The percentage of work done by the high and low-pressure cylinders is easily calculated from the tables of data. The relative power and steam distribution of the compound engine as shown by cards taken at "full-gear" and at "mid-gear" are of more than ordinary interest, and likewise card No. 9 of the compound engine, taken when both throttles were used.

A feature of this work is the manner in which the common difficulty encountered with compound engines while drifting with steam shut off has been met. The usual arrangement of relief valves, one for each steam chest, was first used, and the disturbance, which usually accompanies compounding, occurred in the cylinders, while running with steam shut off down grade. The number of relief valves was then increased, upon the supposition that the need was for a larger air inlet. This did not prove satisfactory. It was then assumed that as the quantity of air admitted was sufficient and the disorder continued, the air inlets were improperly arranged. Upon this supposition, the relief valves of the low-pressure steam chests were all removed and the openings plugged. Air pipes 1 1/2 in. in diameter, with relief valves at the outer ends, were then run through the sides of the smoke box and tapped into the "receiver" pipes; thus adding to the air delivered from the high-pressure cylinder the intake of two additional relief valves at each side. An improvement was immediately apparent. The relief valves worked

with the steady intake of those of a simple engine, and the engine, in so far as the air circulation was concerned, drifted as freely and as quietly as a simple engine would do.

In conclusion it may be said that probably no greater change from the standpoint of economical operation, has even been made on any railroad in an equally short period of time, than that brought about by the use of the Class C-17 locomotives of the Atchison, Topeka & Santa Fé between La Junta and Albuquerque. In this improvement, judged by the records obtained, the compound engine has been in the lead. From figures that we cannot now publish it is clear that average train lengths have been practically doubled and that at the same time the tonnage of trains has increased in about the same proportion. The fuel and water required by the present system of operation is in many instances much less than that required for the lighter engines and lighter ton-

struction and tests of his new locomotives presented in this issue.

#### The Hankow-Canton Railroad.

If the reader will look at a map of China he will see that a line drawn almost due north-and-south from Peking to Canton crosses the Yang-Tse-Kiang at Hankow about midway between Peking and Canton and that at this point the north and south line is furthest from the seacoast. The total distance is about 1,300 miles; and Hankow is about 700 miles inland from Shanghai, nearly due west. The project of a great north and south line of railroad is alluring, and many people have endeavored to get concessions to build more or less of such a line. Mr. Kinder, Chief Engineer of the Imperial Chinese Railways, has already built about 80 miles south from Peking to Pao Ting Fu, which is operating.

Data from Indicator Cards of Compound Taken at Full Gear—West Bound.

Card number.	Date.	Boiler pressure, lbs.	Receiver pressure, lbs.	Smoke box vacuum, in. Hg.	Pyrometer, deg. Fahr.	Rev. per minute.	Speed, miles per hour.	Throttle opening, in.	Cut-off high-pressure cylinder, in.	Cut-off low-pressure cylinder, in.	M. E. P. high-pressure cylinder.	M. E. P. low-pressure cylinder.	I. H. P. high-pressure cylinder.	I. H. P. low-pressure cylinder.	Total I. H. P.	Indicated tractive effort, lbs.	Weight of train, tons.	Number of cars.
1	4-16-99	175	65	5.0	660	36	6	1 1/2	23	21	106.5	69.9	94	147	241	3,192	804.5	29
2	"	180	75	5.5	700	120	2	1 1/2	14 1/2	14 1/2	65.5	39.5	192	249	441	16,603	"	"
3	"	175	60	5.0	670	54	9	1 1/2	22 1/2	22 1/2	12.0	49.5	134	1-1	315	26,171	"	"
4	"	175	65	5.0	64	36	6	1 1/2	21	24	106.5	58.0	94	142	235	29,578	"	"
5	"	175	60	5.0	640	30	5	1 1/2	24	24	103.5	61.0	75	124	200	30,167	"	"
6	"	175	65	4.5	680	84	14	1 1/2	19	19	89.5	42.5	182	242	424	22,885	"	"
7	"	160	60	4.0	680	96	16	1 1/2	17 1/2	17 1/2	77.0	35.0	181	228	408	19,256	"	"
8	"	160	60	4.0	680	48	8	1 1/2	22 1/2	22 1/2	102.5	49.0	121	160	280	26,325	"	"
9	"	180	120	5.0	690	36	6	1 1/2	20	21	72.0	80.0	63	196	259	32,549	"	"
10	"	175	65	4.0	615	108	18	1 1/2	16 1/2	16 1/2	75.5	34.0	199	249	448	18,783	"	"

Data from Indicator Cards of Compound Taken at Mid Gear—East Bound.

Card number.	Date.	Boiler pressure, lbs.	Receiver pressure, lbs.	Smoke box vacuum, in. Hg.	Pyrometer, deg. Fahr.	Rev. per minute.	Speed, miles per hour.	Throttle opening, in.	Cut-off high-pressure cylinder, in.	Cut-off low-pressure cylinder, in.	M. E. P. high-pressure cylinder.	M. E. P. low-pressure cylinder.	I. H. P. high-pressure cylinder.	I. H. P. low-pressure cylinder.	Total I. H. P.	Indicated tractive effort, lbs.	Weight of train, tons.	Number of cars.
13	4-16-99	170	60	4.6	630	72	12	1 1/2	17	19	89.0	38.0	156	186	342	21,503	614	20
14	"	170	60	4.4	670	144	24	1 1/2	13 1/2	16 1/2	65.5	27.5	230	209	499	15,682	"	"
15	"	175	60	3.8	665	78	13	1 1/2	13 1/2	16 1/2	83.0	34.5	158	183	341	19,766	"	"
16	"	178	60	5.8	672	102	17	1 1/2	15 1/2	17 1/2	81.0	32.0	202	222	424	18,777	"	"
17	"	175	60	6.0	670	60	10	1 1/2	19 1/2	21	97.0	42.5	142	173	315	23,769	"	"
18	"	175	60	6.0	675	90	15	1 1/2	18 1/2	20	99.0	37.9	198	226	424	21,307	"	"

Card No. 1.—Taken when starting out of Wagon Mound.

" " 2. " 1/2 mile west of Nolan.  
" " 3. " 1 mile west of Nolan.  
" " 4. " 2 miles west of Nolan.  
" " 5. " 2 1/2 miles west of Nolan.  
" " 6. " when ascending Tipton Hill.  
" " 7. " when ascending Tipton Hill.  
" " 8. " on heavy grade between Shoemaker and Watrous.  
" " 9. " when ascending Tipton Hill.

Card No. 10.—Taken when approaching crest of Levy Hill.

" " 13. " between Wagon Mound and Levy.  
" " 14. " between Shoemaker and crest of Tipton Hill.  
" " 15. " between Las Vegas and Azul.  
" " 16. " between Las Vegas and Azul.  
" " 17. " between Shoemaker and crest of Tipton Hill.  
" " 18. " between Wagon Mound and Levy.

age of a relatively short time ago. The average cost of transportation for the two periods, past and present, is very materially in favor of the heavier engines.

The rapid advancement of the Atchison, Topeka & Santa Fé, under its present judicious management, in the matter of powerful and economical locomotives, as well as along other lines, has been most remarkable. We are indebted to Mr. Player and Mr. Hoffman for the complete information regarding the con-

What is nominally a Belgian syndicate but practically, we suppose, Russian or Russo-French, has a concession for 600 miles more from Pao Ting Fu to Hankow. The "Brice concession," so-called, is for the remainder from Hankow to Canton, 742 miles.

Eight months ago Mr. William Barclay Parsons, of New York, went out to China to organize and conduct a survey of the Brice route, and last week he returned to New York. He carried a stadia line from Hankow to Canton, 742 miles, and made fur-



ther surveys of about 200 miles by odometer, pocket compass and pocket level. The stadia survey was made at an average rate of  $9\frac{1}{2}$  miles a day, the total time from Hankow to Canton having been 77 days. The 200 miles of compass reconnaissance was thrown in, being done by the Chief Engineer personally. The reader who is familiar with such matters will see that this was a pretty expeditious job. Hankow and Canton are fixed astronomically. Therefore, the accuracy of the stadia line in the main could be somewhat controlled, and in fact it closed on Canton

within about one-half mile. The level was carried by means of the stadia.

The line passes through some difficult country and from end to end it is not easy. Up the Yang-Tse-Kiang and up the Slang-Kiang, an affluent of the Yang-Tse-Kiang, the conditions are difficult in that the level of the country falls away as one goes back from the river, and the flood in the Yang-Tse-Kiang rises 40 and sometimes even 52 ft. Consequently, great areas back from the river are flooded. The rivers are more or less completely diked, but a line built near them must be carried on a very heavy bank. It is not improbable that if this line of railroad



Fig. 1.—The Sweeney Nozzle.

road is built it will be carried inland some 15 miles from the river to the foothills of the inland plateau, but this would involve its own difficulties, as the foothills are cut by deep ravines and probably the alignment can not be as favorable as by keeping closer to the rivers.

After the Slang-Kiang is left, the line, which follows up a branch of that stream, gets into mountains, and it crosses a divide at an altitude of about 1,200 ft. above the sea. Mr. Parsons here found a pass some distance east of the old trade highway and lower than the pass by which that highway crosses, and he got through the mountains with maximum grades of about one per cent. Going down the southern slope he came to the Pei-Ho,\* down which river the line is carried some of the way through difficult cañons.

On the whole, the project is bound to be more costly than has generally been supposed. The southern part of the line will necessitate some heavy rock work and a few short tunnels.

Obviously, it would not be proper to say now anything of the estimates of the future working expenses and revenues of such a railroad. To get facts and make such estimates was part of the work for which Mr. Parsons was sent out. It is enough to say that the Province of Hunan, through which the railroad goes, is rich and thickly peopled and it contains great deposits of coal which would be carried both ways by the railroad. This coal is now brought down by boat to Hankow for the steel mills established there. Coke is made at the mines. The tea trade of the line would also be important and obviously the dense population of the Province must produce and consume a great deal of material.

The Province of Hunan has long been hostile to foreigners and a considerable part of the country over which the survey was carried had never been crossed by a European. Lord Charles Beresford says that it is the most hostile province of China. The Governor of the Province at first declined to permit

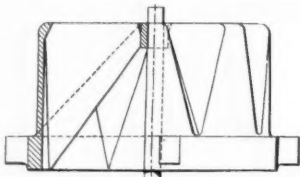


Fig. 2.

Mr. Parsons and his party to cross, and the general opinion was opposed to his undertaking the survey. In fact it was carried through with no very serious trouble, although the party, or members of it, were attacked several times by mobs. A considerable guard of Chinese soldiers accompanied the party throughout the expedition. Sometimes this guard numbered 300 men, but we judge that the patience and firmness of the Chief Engineer had a good deal more to do with the safety of the party than the presence of the soldiers.

Mr. Parsons was accompanied on the expedition by Capt. W. W. Rich, recently of Minneapolis, now Engineer to Sheng, the Imperial Director of Chinese Railroads. He had with him five engineers; also

\* There is another and better-known Pei-Ho in the North.

Mr. Charles Denby, Jr., son of the late U. S. Minister to China, who acted as interpreter; a physician and two Chinese secretaries of Sheng, the Taotai. These latter gentlemen spoke English fluently. Notwithstanding the hostility of the people of the Province, Mr. Parsons thinks the expedition had less annoyance than an expedition of Chinese surveyors would have in going through many parts of our own country, in which remark we think that we detect an allusion to the enlightened spirit of the average American where the Chinaman is concerned.

The route from Hankow to Canton is an old trade route and was for many years the main course of trade between the Yang-Tse-Kiang Valley and the sea. Some 40 years ago, however, the port of Hankow was opened to trade and now the traffic by the north and south land route is small. This trade is carried on by boats on the rivers, the draft of these boats constantly diminishing until the smallest of them on the upper waters draw but three or four inches. There is a portage over the mountains of about 30 miles. Here is a high-road 15 ft. wide, paved with stone over which goods are carried on the backs of coolies and on ponies. The party was able to carry its supplies by boats by following this old trade route and generally could get back to the boats to sleep. When they were obliged to sleep on land they could find a temple or some vacant public building, such as an examination hall, and occasionally slept in a Chinese inn, which seems to have been the last resort.

For obvious reasons we can say nothing about the present plans of the concessionaries.

While the actual work of carrying on this survey was attended by anxieties and considerable danger, it really was the least perplexing part of the work which had to be done. The most serious of Mr. Parsons' tasks was diplomatic, which part of the enterprise would make a story which would be very entertaining if it could be made public. The Chinese officials were very polite and did what they could to assist the undertaking, while the representatives of the British Government showed their sympathy in the most practical manner to the Anglo-American idea, which feeling is strong in the East.

The members of the engineering party which accompanied Mr. Parsons consisted of R. C. Hunt, engineer in charge; A. E. Coulter, topographer; H. B. Magor, instrument man; W. K. Brice, rodman; W. S. K. Wetmore, rodman.

#### A New Locomotive Exhaust Nozzle.

During the past year Mr. W. H. VanDervoort, Assistant Professor of Mechanical Engineering at the University of Illinois, and Mr. Don Sweeney, a post-graduate student, have made some interesting tests of locomotive exhaust nozzles in which the action of a new nozzle designed and patented by Mr. Sweeney was compared with that of the Smith triple expansion nozzle and several common round nozzles of different sizes. Prof. VanDervoort has kindly furnished data regarding these tests, and also the records of the performance of several locomotives which have been fitted with the new nozzles. The tests also show in a general way what may be gained by reducing the back pressure in locomotive cylinders.

It was found that, with a smokebox of given size, the vacuum produced by the exhaust jet depends mainly on the velocity of the exhaust at the orifice of the nozzle, and the perfectness of the entraining action on the gases. In the common nozzle the entraining action is weak since the issuing jet, due to its density, does not readily take up the products of combustion until it has become thoroughly expanded in the stack, consequently a higher velocity of discharge is required than is the case where the entraining action is more perfect. High velocity, it is well known, means high back pressure and correspondingly large work losses in the cylinders.

The average 18 or 19 in. by 24 or 26 in. locomotive usually runs with about a  $4\frac{1}{2}$  in. single nozzle tip, or 15.9 sq. in. of exhaust area, but more locomotives will probably be found with tips smaller than  $4\frac{1}{2}$  in. than larger; light service, large boilers and good coal being the conditions which enable the use of the larger tips. In this connection it is interesting to note that the high speed stationary engine builder uses a  $4\frac{1}{2}$  in. exhaust pipe for a 10 by 10 in. engine to avoid the losses due to back pressure, yet the conditions under which a locomotive operates compels the use of a no larger exhaust opening for two 19 by 26 in. cylinders. In the locomotive the two points of contracted exhaust are usually at the steam port, when open to exhaust, and at the tip. When the area of the tip equals the area of the port opening, materially greater reductions in back pressure cannot be expected from the use of larger tips, but this, except in the case of improperly proportioned valves, does not often occur, and naturally the tip is considered the proper point at which to reduce back pressure. Since increasing the area of the tip reduces the vacuum in the smokebox and injures the steaming qualities of the boiler, the limit in this direction is quickly reached, and usually the exhaust is found choked to about 60 per cent. of the port opening. The new nozzle was designed with a view to overcoming the contraction necessary in the usual nozzles by providing a more complete admixture of

the steam and products of combustion immediately after the steam leaves the tip, thus producing a powerful entraining action, and maintaining the required vacuum with a lower velocity of the exhaust steam, corresponding larger tip area and lower back pressure in the cylinders.

In Fig. 1 is shown a view of the new nozzle. The pipe enlarges slightly from the base to the tip, being 12 in. in inside diameter at the top, and thus forming a small receiver which serves to prolong the exhaust, thereby maintaining a more steady

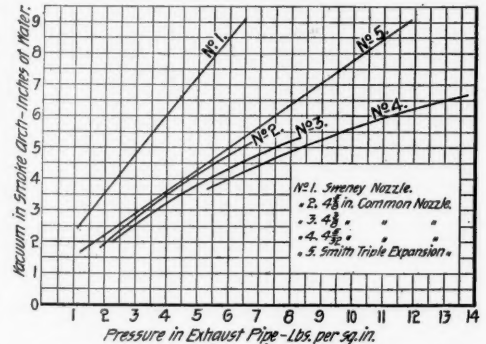


Fig. 4.—Draft Diagrams of Various Exhaust Nozzles.

vacuum, with less sharp action on the fire which clinkers the tube sheet and pulls excessive quantities of sparks through the tubes. Each one of the several radiating ports is a separate nozzle. The velocity of the steam does not increase until within a few inches of the top, so that long contracted passages are avoided. The steam issuing from adjacent ports comes together a short distance above the top of the tip and forms with the recesses between the ports vacuum pockets into which the gases are drawn and mixed with the steam at the point of its maximum velocity, thus imparting its high velocity to the gases at the base of the stack. The blower is placed in the center and connected with the upper pipe connections, shown on the side of the nozzle pipe. The air pump exhaust enters at the lower connection. A sectional drawing of the tip is shown in Fig. 2.

The experiments with this nozzle were made under actual running conditions on an Illinois Central mogul freight locomotive, No. 420, between Champaign and Centralia. The first series involved draft and back pressure relations with the Sweeney nozzle, using pipes of different height, different forms of stack and diaphragm arrangements. A similar series was then made with the plain single pipe using three sizes of tips, and with the Smith triple expansion pipe. In these experiments a pressure gage was connected with the base of the nozzle pipe, and a water gage with the interior of the smokebox, the arrangements being the same in all cases. A large number of simultaneous readings were taken from the gages and all readings plotted, the observations covering the various conditions as to thickness of fire, speed and working of the engine throughout a run of 125 miles.

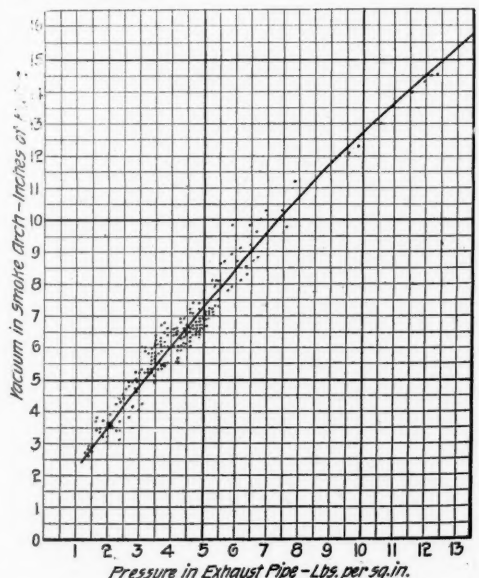


Fig. 3.—Draft Diagram of the Sweeney Exhaust Nozzle.

In Fig. 3 is shown the draft diagram for the Sweeney nozzle. It will be noted that the draft increases with the back pressure in almost a direct proportion for all working conditions and that it falls slightly for the excessive draft conditions shown by the upper points of the curve. These upper points were obtained by quickly placing the reverse lever forward when running at high speed simply for the purpose of determining the character of the curve. That portion of the curve between four and seven inches of draft represents the working limit, ordinary conditions giving from five to six inches.



The curves for the other nozzles were plotted in the same way and for comparison all curves are shown in Fig. 4. Referring to the curves, No. 1 is for the Sweeney tip with 19 sq. in. of exhaust opening; No. 2 for the 4% in. common tip, 16.8 sq. in. opening; No. 3 for the 4% in. common tip, 15 sq. in. opening; No. 4 for the 4% in. common tip, 13.5 sq. in. area, and No. 5 for the Smith triple expansion nozzle with 16.5 sq. in. opening. The test of the Smith pipe was made on an engine in passenger service. In all cases except that represented by curve No. 2, the engines steamed freely. Curve No. 5 is of the same general character as No. 1, the draft increasing almost directly with the back pressure. With nozzles Nos. 2, 3 and 4, however, the curves incline towards the horizontal axis, and show how great the back pressure becomes when a strong draft is required, also, how excessive reductions in tip area on over-cylindered or poor steaming engines, while apparently improving their steaming qualities, do not materially increase the quantity of steam made, but choke the engine to such an extent that it cannot use the steam to advantage. An inspection of these curves shows that the new nozzle produces through the working range, equal draft at about one-half the back pressure required by the other nozzles.

In order to know definitely the engine economy resulting from the use of the larger nozzle, one cylinder of engine No. 417 of the same class as No. 420

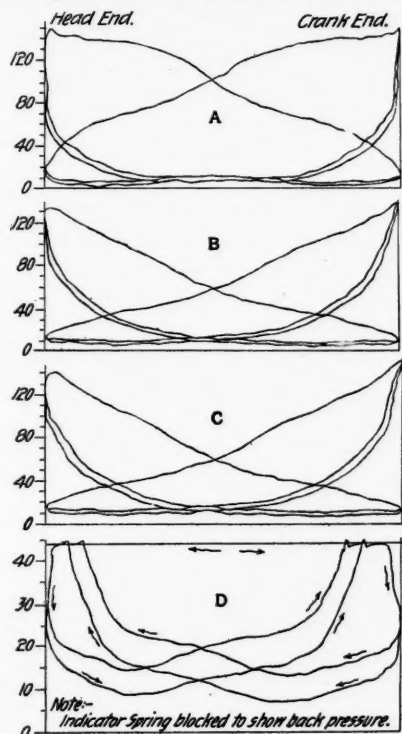


Fig. 6.—Indicator Diagrams Comparing 4½ and 5 in. Circular Exhaust Tips.

Data from Indicator Cards, Fig. 6

Cylinders ..... 19x26 in.  
Area exhaust openings ..... 15.9 and 19.6 sq. in.

Card.	A	B	C	D
Speed, miles per hour. ....	12	30	36	14
Cut-off, inches of stroke. ....	10	8	8	10
Mean effective pressure, (Large tip. ....	84.12	45.39	47.66	...
head end, lbs. per sq. in. (Small tip. ....	80.42	41.60	42.40	...
Difference. ....	3.70	3.69	5.26	...
Gain in M. E. P., per cent. ....	4.6	8.9	12.41	...
Mean effective pressure, (Large tip. ....	86.95	47.28	46.8	...
crank end, lbs. per sq. in. (Small tip. ....	83.28	42.74	42.2	...
Difference. ....	3.67	4.54	4.6	...
Gain in M. E. P., per cent. ....	4.4	10.62	10.9	...
Increase in power, per cent. ....	4.5	9.76	11.65	...

was indicated. Since it is necessary to have all conditions alike when diagrams are to be compared, the device shown in Fig. 5 was applied. This tip consisted of the body, A, which was secured in the top of the pipe in place of the regular tip bushing, and the cap B, which was hinged to A, as shown. The shaft, C, which opened or closed B, extended through the smokebox and was operated on the outside by a lever. When B was closed on A, the steam exhausted through 15.9 sq. in. of tip area, and when B was thrown back into the dotted position the area of the tip was 19.6 sq. in., or approximately 20 per cent. increase; this, for equal steaming, represents closely the increase in area of the Sweeney over the plain tip. With this device the tip area could be quickly changed and indicator diagrams for each tip opening taken within five seconds of each other.

In Fig. 6 are shown four diagrams, A, B, C and D, taken in the way described. They are average cards. Diagrams A, B and C, with the data and calculated results given, need little explanation. They are typical locomotive indicator diagrams and the admission and expansion lines so nearly coincide that no difference is apparent in the engraving; on the original cards the lines could scarcely be distinguished one from the other. The increased loss due to back pressure as speed increased is clearly

brought out; the percentage of gain being relatively small for slow speeds, but increasing steadily as the speed increases. A conservative estimate would give at least 5 per cent. gain in power for the same steam and fuel consumption due to the reduced back pressure.

Card C is of interest as it shows comparative back pressures on an enlarged scale. The diagram was taken with a 20 lb. spring, the piston of the indicator being blocked. The increased back pressure during the period when both cylinders are exhausting into the pipe is clearly shown on this card.

Last October the experiments were continued by fitting another Illinois Central mogul freight locomotive, No. 413, with one of the new nozzles, having an opening of 20 sq. in., with a view to determining the effect on the engine performance when in regular service. This locomotive has 19x26 in. cylinders, and was formerly run with a common 4% in. bridged exhaust nozzle having an opening of 16.3 sq. in. The results as shown by the monthly performance sheet are given in Table 1, and it is reported that a marked improvement has been noticed in both the steaming of the boiler and the ability to make fast time.

Table I.—Performance of Illinois Central Freight Locomotive No. 413.

Month.	Ranking position of No. 413.		Miles run per ton of coal.			
	Plain exhaust nozzle.	Sweeney exhaust nozzle.	No. 413.		Average of class—20 engines.	
			1897.	1898.	1897.	1898.
October .....	9	6	15.91	15.67	15.56	14.80
November .....	3	2	14.58	15.69	13.28	14.74
December .....	14	1	13.0	16.03	14.44	13.7
January .....	1898.	1899.	1898.	1899.	1898.	1899.
February .....	4	13	14.87	12.6	13.9	13.75
March .....	4	2	16.57	15.49	15.87	13.73
April .....	3	8	17.37	15.58	15.66	15.66

\* In the shops.

It is impossible to make anything like exact comparisons from service records, as so much depends on the weight and kind of trains hauled and the way in which the locomotives are handled. As an illustration of the first, the record for April last of the engine fitted with the new nozzle can be cited, as during the month 55 per cent. of the trains hauled happened to be unusually heavy ones. During the whole time shown, however, the locomotive was handled by the same engineman with the exception of three weeks in last February, when an "extra" engineman plainly affected the performance. The ranking position of engine No. 413 for the five corresponding months for which figures are available probably forms the best comparison. During this time its average ranking position in the class of 20 locomotives when fitted with the common form of exhaust nozzle was 6.6, or a little better than seventh place, while with the new nozzle the average rank was 3.8, or a little better than fourth place.

Similar figures are presented in Table II for an 18x26 in., Illinois Central, eight-wheel passenger locomotive, No. 965, in which a Smith triple expansion exhaust nozzle, having an opening of 15.8 sq. in., was replaced, during the latter part of February, by a Sweeney nozzle with an opening of 18.7 sq. in. The four engines of this class are all in the same service and are double-crewed, the same men handling the engine in question during the months compared.

Table II.—Performance of Illinois Central Passenger Locomotive No. 965.

Month.	Miles run per ton of coal.			
	No. 965.		Average of class—4 engines.	
	1898.	1899.	1898.	1899.
March .....	26.76	30.98	26.66	28.88
April .....	26.12	33.72	26.34	30.45
May .....	30.21	34.5	30.12	.....

\* First 15 days only.

It will be noted that there is not only a marked improvement in the coal record of engine No. 965 for the months when the new nozzle was used over similar months of the previous year, but the performance is considerably better when compared with the average performance of all the engines for the same month in 1899. As might be expected, the larger exhaust nozzle enables the locomotive to make better time, and as in the previous case although the draft is mild the boiler steams freely.

One of the new nozzles has also been used with an Illinois Central suburban engine at Chicago since the latter part of March, and the performance sheet for April shows that the number of miles run per ton of coal was 22.1 against 18 miles for the same month of last year when a Smith nozzle was used. Similar figures for the average of the class of ten engines was 20.6 for April, 1898, and for April, 1899, 22.28 miles per ton of coal.

The new nozzles have also been used on the Peoria

& Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis with some over-cylindered consolidation freight engines which had often failed formerly for lack of steam. With these engines the improvement brought about by the new nozzles has been very marked. In this connection, a rather interesting fact has developed that because of the reduction in the back pressure somewhat heavier trains can be hauled over the ruling grades; this is not due to the locomotive exerting more power when pulling at slow speeds, but because it is possible to make a faster run when approaching the foot of the grade.

Since the theory of the Sweeney nozzle depends on

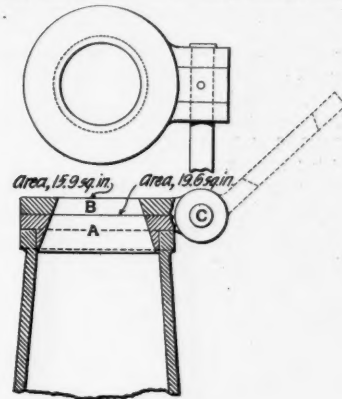


Fig. 5.

the entraining action, the gases are distributed as equally as possible around the pipe and delivered to it at a low point, and in Fig. 7 is shown the front end arrangement which has been used in connection with this nozzle. As shown, the deflecting plate is carried quite low. The horizontal plate is provided with about three square feet of netting around the pipe and the forward netting is placed low, reaching but little above the middle of the arch, with a horizontal plate extending forward to the door. The diaphragm is placed ahead of the pipe. An extension to the stack terminating in a wide mouthed flounce reaches to within a few inches of the top of the tip. This arrangement has been found to clean the front end well, and equalize the draft on the tubes. As with all nozzles the exhaust openings will gum up, but the ports are easily cleaned with a knife without taking the tip out. This attention once in two months is said to keep the openings free.

#### The Tramp and the Railroad.

Finally we come to the great and pathetic class of trespassers. Of these, 3,913 were killed (1897), or more than 60 per cent. of all the fatalities. Relatively, very few of these were killed in train accidents; a few more at highway crossings; about 8 per cent. at stations, and much the greatest number walking on tracks and about yards. To be sure, many of these people were tramps, and could well be spared, but many others were respectable and useful citizens, and innocent children who might have become useful citizens.

This class of railroad mortality is one of the disgraceful facts of our civilization. Year after year more than ten people are killed every day on the railroads of the United States because they are where they have no business to be. These daily deaths are

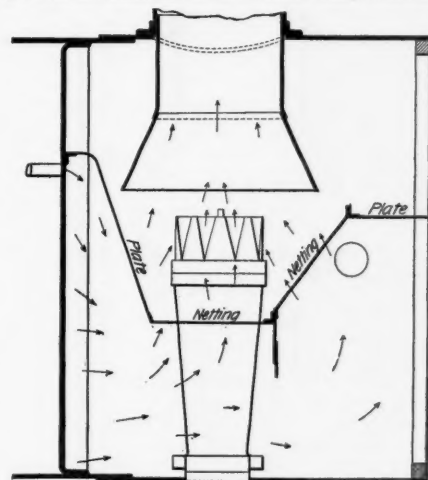


Fig. 7.—Front End Arrangement Used with the Sweeney Exhaust Nozzle.

two or three times as many as the deaths among our soldiers in the Philippines since the fighting began there, and they are all to no purpose. It is an absolute waste of human life.

But this is a matter in which the railroads are practically helpless. The American citizen thinks that it is one of the privileges of a freeman to walk on railroad tracks, and one of the privileges of a freeman's boy to play around railroad yards, and swing on the steps of moving cars, and steal a ride



on the pilot of a switching engine. He even smiles good naturedly at the tramp who walks the tracks, and rides on the trucks under the cars, and invades the box cars, and fights and sometimes kills the train hands, and pilfers freight, and wrecks trains and burns bridges to get square with the company which has sent him to the workhouse.

Obviously, any one, either citizen or tramp, who trespasses on a railroad, imperils not only his own life, but the lives of other people, for his body may derail a train, and a malicious person may turn a switch or pull spikes or put ties on the track. All this being so, the man from Mars would assume that any one trespassing on the railroad right-of-way would risk prompt arrest and fine or imprisonment. A few railroad companies try to be prompt and vigorous with disreputable or suspicious persons, but none of them tries to punish for trespass the respectable citizen. They all go to more or less expense to maintain their private police force, and one at least has established elaborate police arrangements to try to diminish trespass.

But public opinion would not stand the punishment of respectable citizens for trespassing on the railroad right-of-way, and it hardly tolerates the summary treatment of vagabonds and tramps. Counties and municipalities generally try to dodge the expense of handling railroad trespassers, unless the case is very flagrant. They do not like to incur the cost of arrest, prosecution and punishment; and so they neglect to protect property invested in railroads from trespass, and to protect travelers by rail, and those who work on the railroads, from the various kinds of injury which malicious persons are constantly doing, which kinds of injury run all the way from beating watchmen and trainmen to wrecking passenger trains. So ten people a day, or more, are

I should like a statement from you in regard to the situation."

I had not been an hour on my travels when it was made very plain to me that my employer's police force was so vigilant that it behooved me not to be caught riding trains unauthorized on his lines. Every tramp I met warned me against this particular road, and although a clause in my contract secured me the payment by the company of all fines that might be imposed upon me as a trespasser, as well as my salary during imprisonment, in case I should find it useful for my purposes to go to jail, I found it more convenient for the first month to wander about on railroads which I knew tramps could get over. I reasoned that the experience was going to be hard enough anyhow, without having to dodge a railroad police officer every time I boarded a train, and I knew that the trespassers on neighboring lines would be able to tell me what was the general opinion in regard to my employer's road as a tramp thoroughfare. All whom I interviewed spoke of it as the hardest railroad in the United States for a tramp to beat, and I could not have learned more of the tramps' opinion of it had I remained exclusively on the property. The roads that I went over crossed and recrossed my employer's road at a number of places, and I was frequently able to see for myself that it is a closed line for trespassers.

When I returned to my employer for further orders he said to me, "Well, now that you have satisfied me in regard to the attitude of the tramp toward the company's property, suppose you satisfy yourself concerning the attitude of the company toward the tramp." To make my final report complete it was obvious that I ought to get an insight into the workings of my employer's police force, and for the second month he gave me permission to travel on

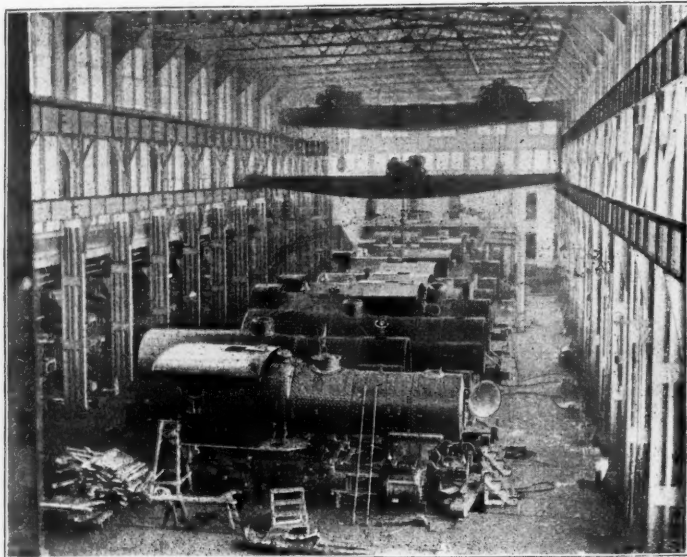
from place to place free of charge, and there is no reason why this country should do so.

Taking this country by and large, it is no exaggeration to say that every night in the year 10,000 free passengers of the tramp genus travel on the different railroads in the ways mentioned, and that 10,000 more are waiting at watering tanks and in railroad yards for opportunities to get on the trains. I estimate the professional tramp population at about 60,000, a third of whom are generally on the move.

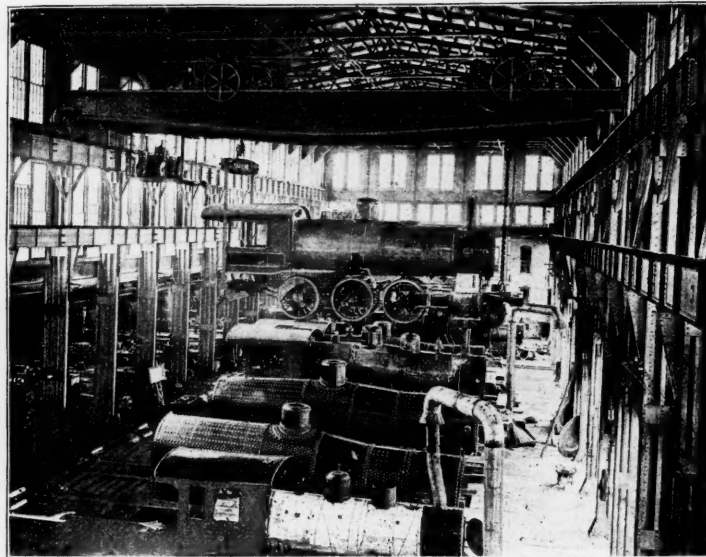
That railroad companies should have to reimburse trespassers for the loss of a hand or foot while riding unauthorized on trains will strike every one as a very unjust tax on their resources, but such claims are constantly made.

The railroads also help to keep the tramp element in our large cities. The more the criminal element of a country fastens itself upon its cities, the harder it is to break up, and in the United States this is what is taking place. Chicago, for instance, is as much a center in the criminal as in the business world, and almost every freight train entering it brings a contribution to its criminal population.

Can the tramps be driven off the railroads? It was to satisfy my own curiosity in regard to this question, and to find out how successful my employer, the general manager, had been in his attempt to answer it in the affirmative, that I undertook the investigation which I have described. Previous to his efforts to keep tramps off railroads, it had been thought, as he has stated, that it was cheaper to put up with them, nuisance though they were, than to pay the bills which a crusade against them would occasion. It has at last been demonstrated, however, that tramps can be refused free transportation by one of our greatest railroads, with a saving of expense to the company and with great benefit to the



New Erecting Shop of the Brooks Locomotive Works, Dunkirk, N. Y.



killed because we are a good-natured and careless people.—H. G. Prout, in *Munsey* for June.

I was asked by the general manager of one of our railroads to make a report to him on the tramp situation on the lines under his control. For three years he had been organizing a railroad police force which was to rid the lines under his control of the tramp nuisance, and he believed that he was gradually succeeding in his task; but he wanted me to go over his property and give an independent opinion of what had been done.

"On assuming management of these lines," he said to me in the conversation we had in his office, "I found that our trains were carrying thousands of trespassers, and that our freight cars were frequently being robbed. I considered it a part of my business as a general manager to do my utmost to relieve the company of this expense, and I felt that the company owed it to the public to refuse to harbor this criminal class of people. In a way a railroad may be called the chief citizen of a State, and in this tramp matter it seemed to me that it had a duty as a citizen to discharge to the State.

"There are three conspicuous reasons that have deterred railroad people from attacking the tramp problem. First, it has been thought that it would entail a very great expense. Our experience on these lines has shown that this fear was not warranted. Second, it has been thought that no support would be given the movement by the local magistrates and police authorities. Our experience shows that in a great majority of cases we have the active support of the local police authorities and that the magistrates have done their full duty. Third, it was feared that there might be some retaliation by the tramps. Up to date we have but very little to complain of on that score. From the reports that I get from my men I am led to believe that we are gradually ridding not only the railroad property, but much of the territory in which it is situated, of the tramp nuisance; but

freight trains, engines and passenger trains, and a letter introducing me to the different employees of the company with whom I was likely to come in contact. With these credentials I was able to circulate freely over the property, to inquire minutely into the work of the police department, to meet the local magistrates, and particularly the jail and workhouse keepers. It was also possible for me to make an actual count of the trespassers who were daring enough to attempt to travel on this closed road.

After 30 days of almost constant travel I was convinced first that the tramps had told the truth about the road, and that it is exceedingly difficult to trespass on it with impunity; second, that although the police force is not perfect (none is), it was doing exceptionally good work in freeing the community of tramps and beggars. It differs from ordinary railroad police forces in that it is systematically organized and governed. In dealing with tramps and trespassers the plan is to keep up a continuous surveillance of them, and they are taken off trains one by one, day after day, rather than in squads of fifty and sixty, with no more effort in this direction for weeks and sometimes months, as is the prevailing custom on most railroads. There is consequently very little crowding of magistrates' courts and jails, and the taxpayers are not forced to board and lodge a great collection of vagabonds. I was also impressed with the fact that the force is on friendly relations with municipal and village police organizations along the road, and has the respect of communities formerly at the mercy of a constantly increasing army of hoboes.

It is now my firm belief that, if the tramps can be kept off the railroads, their organization will become so unattractive that it will never again appeal to men as it has done in the past; and the purpose of this paper is to make plain the necessity of keeping them off the railroads, and to show what results from their present unique position in railroad life. No other country in the world transports its beggars

community, and the time has come when the public is justified in demanding that all railroads take a similar stand in regard to this evil.—Josiah Flynt in the *June Century*.

We assume that the railroad of which Mr. Flynt speaks in this article is the Pennsylvania lines, and that the General Manager is Mr. Loree. We hope that the reader has not forgotten Mr. Loree's admirable account of the work of his police which appeared in the *Railroad Gazette* Oct. 14, 1898, page 739.

#### A Modern Locomotive Erecting Shop.

The Brooks Locomotive Works has recently added to its extensive plant at Dunkirk, N. Y., a new erecting shop, views of which are shown by the accompanying engravings. This new building is representative of the latest practice in shop design and has a number of interesting features. It covers an area of 17,526 sq. ft. and is 254 ft. long, 69 ft. wide and 60 ft. high to the apex of the roof. The frame of the building is composed entirely of structural steel, furnished and erected by the Shiffler Bridge Co., of Pittsburgh, Pa. The walls above the upper crane runway are of brick, while below the runway the outside wall is wholly of glass set in substantial wooden frames, the lower tiers being arranged on balance weights, so they can conveniently be raised when locomotives are to be taken in or out. The opposite side of the building opens directly into the old erecting shop, thus more than doubling the floor space heretofore available for the erection of locomotives.

Within the floor space is included 16 engine pits of brick masonry 4 ft. wide and 40 ft. long between the rails. The space not occupied by these pits is floored over with a 4-in. covering of tar concrete, above which is laid, diagonally, a floor of 2-in. hem-





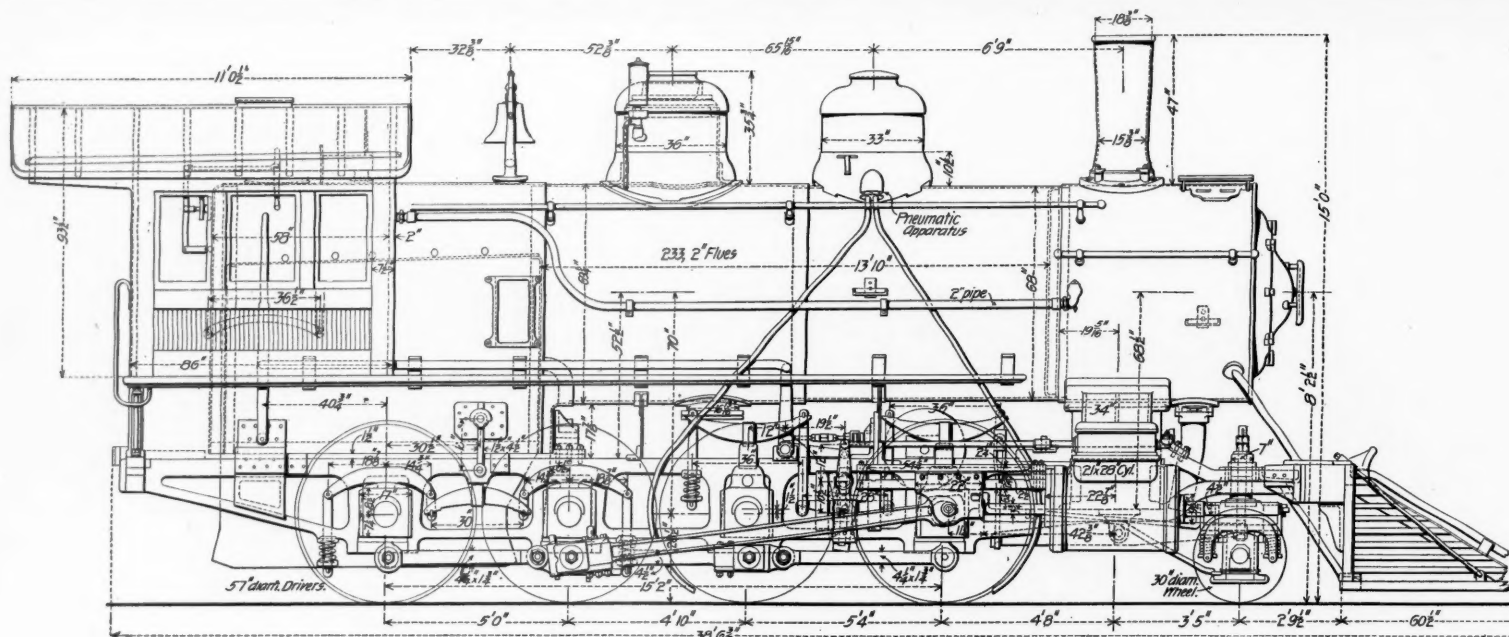


Fig. 1. — Simple Consolidation Locomotive—Atchison, Topeka & Santa Fe Railway.

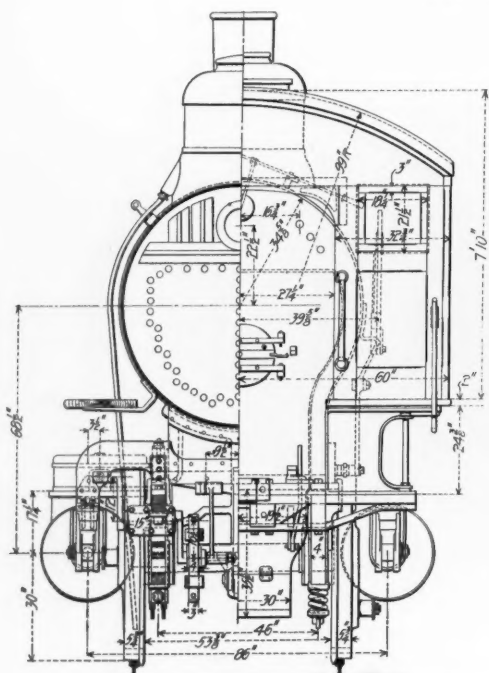
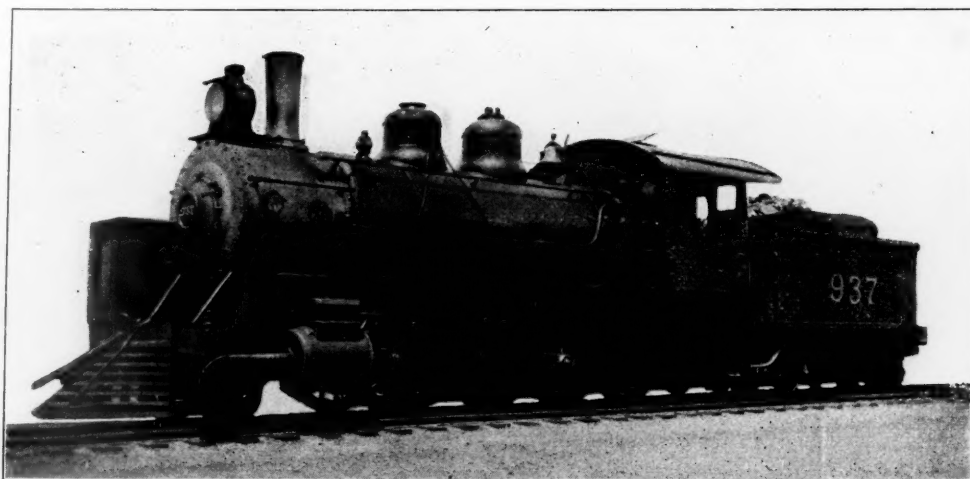


Fig. 1A.—Section Simple Consolidation Locomotive.



Standard Consolidation Locomotive 937, A. T. & S. F. Ry.—Cylinders 21 x 28 in.

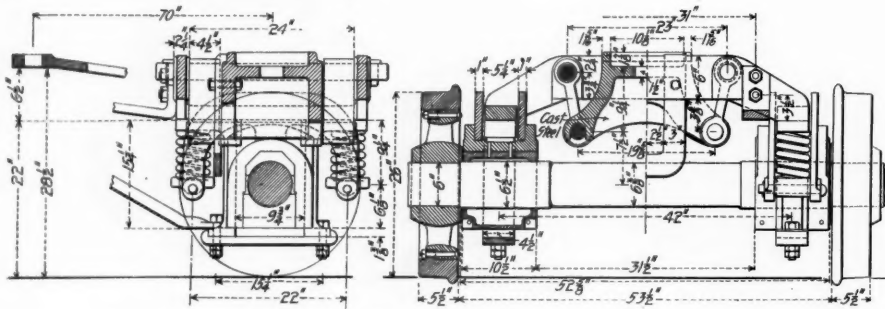
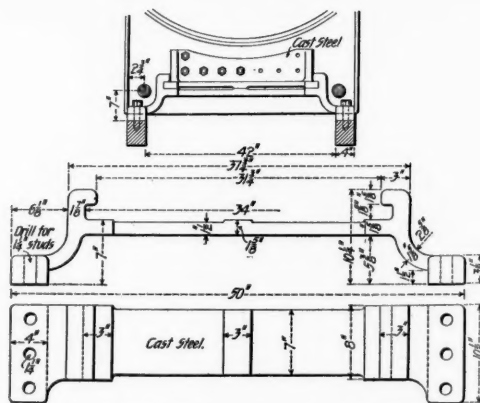


Fig. 1D.—Engine Truck for Tandem Compound.



Frame and Boiler Connection at Throat Sheet, 21 x 28 Consolidation Engine.

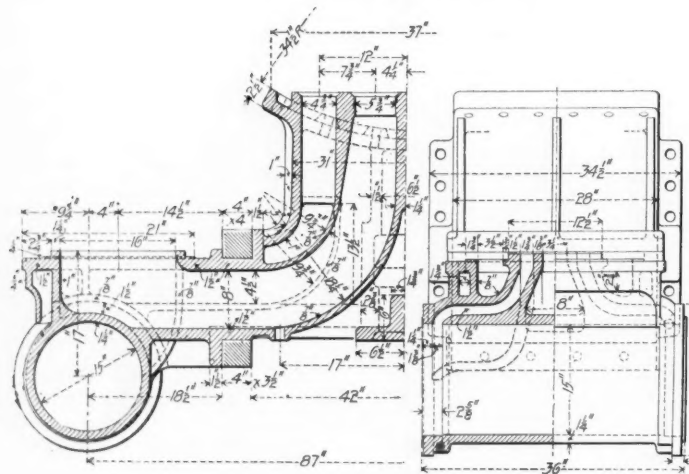


Fig. 1B.—High-Pressure Cylinder, 15 x 28, for Tandem Compound.

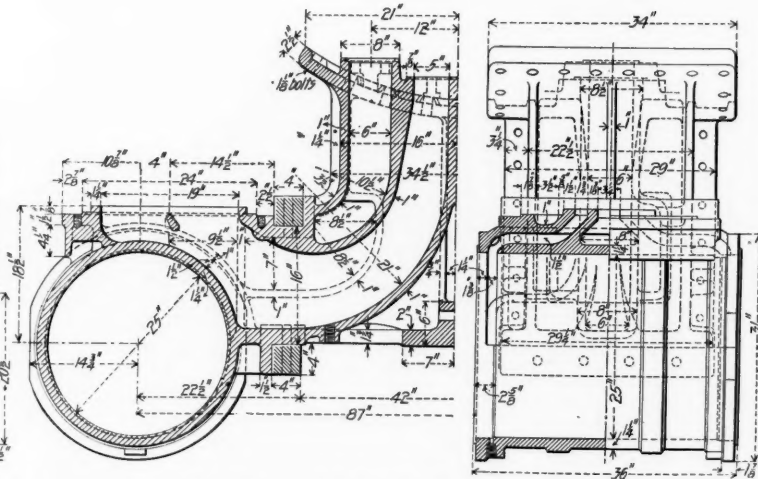


Fig. 1C.—Low Pressure Cylinder, 25 x 28, for Tandem Compound.

SIMPLE CONSOLIDATION LOCOMOTIVE "937" AND TANDEM COMPOUND CONSOL



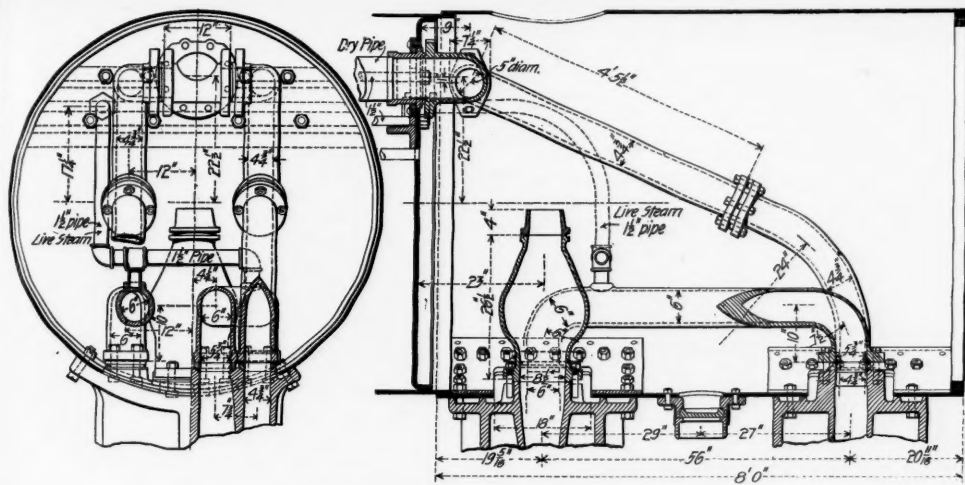
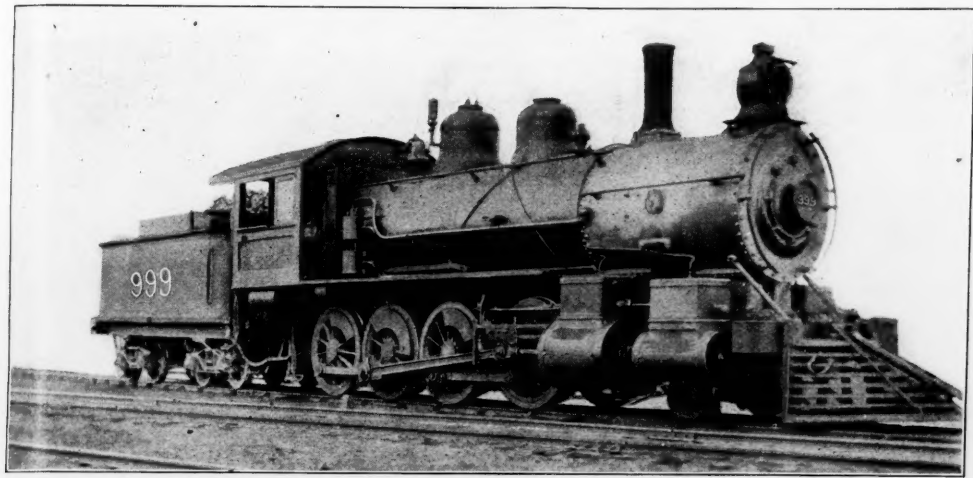


Fig. 2A.—Front End for Tandem Compound.



Tandem Compound Consolidation Locomotive 999, A. T. & S. F. Ry.—Cylinders 15 and 25 x 28 in.

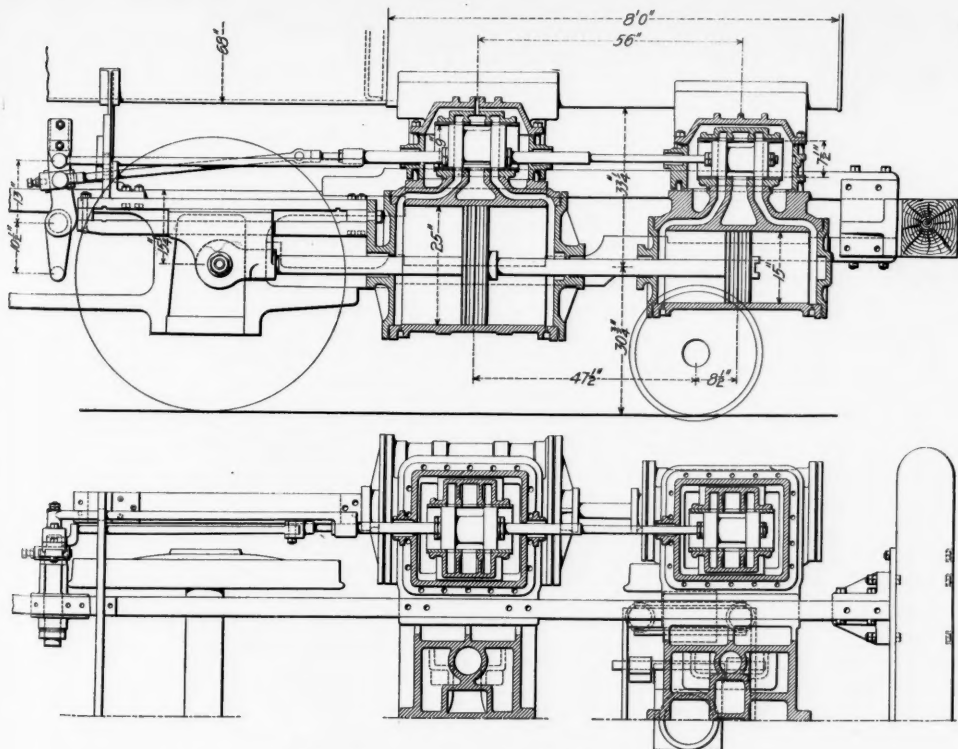
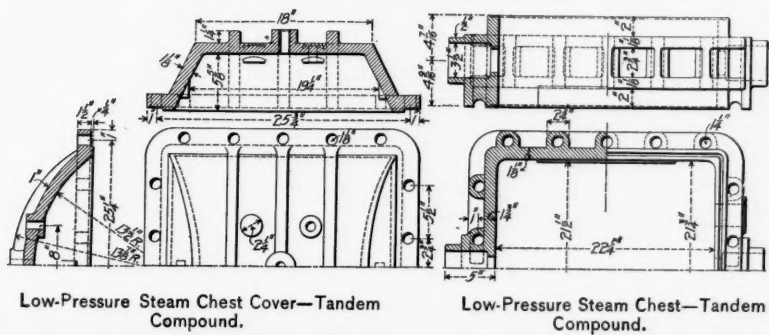


Fig. 4.—Cylinder and Valve Arrangement of the Tandem Compound.



Low-Pressure Steam Chest Cover—Tandem Compound.

Low-Pressure Steam Chest—Tandem Compound.

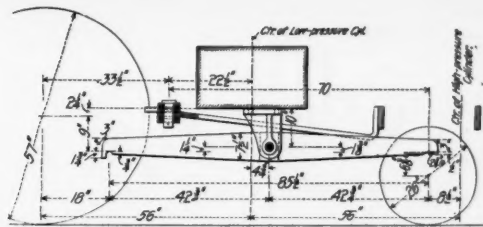
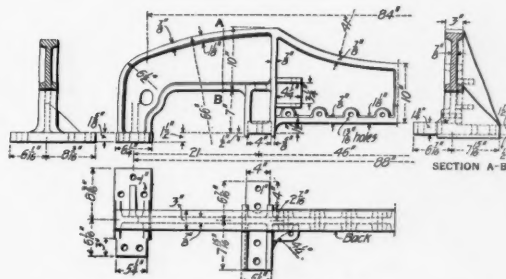
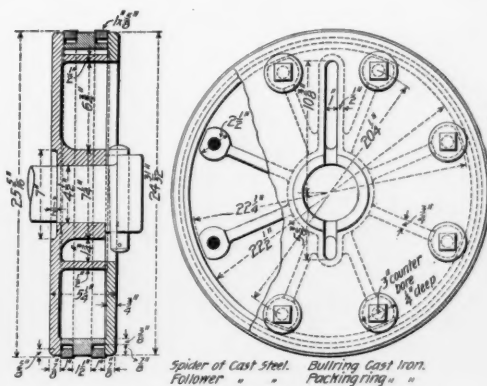


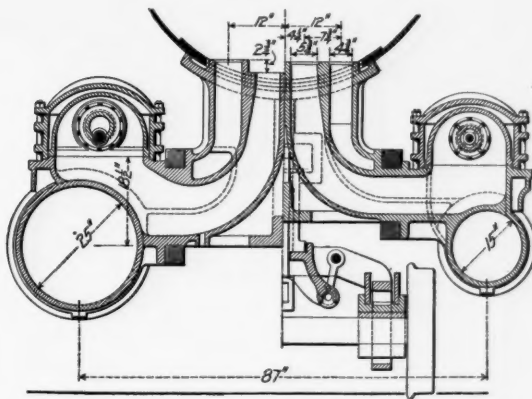
Fig. 1E.—Location of Front Equalizer for Tandem Compound.



Cast Steel Guide Yoke for Tandem Compound.

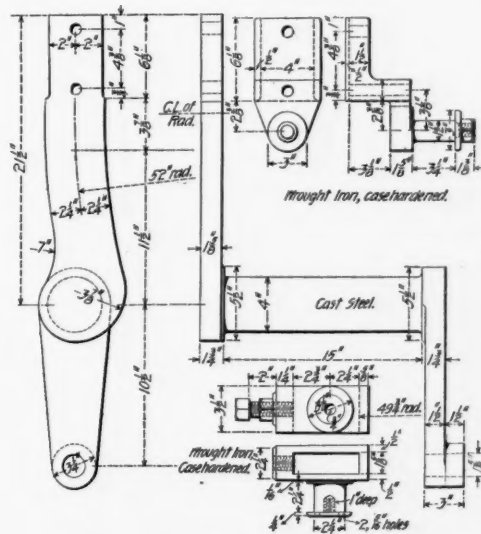


Low-Pressure Piston for Tandem Compound.

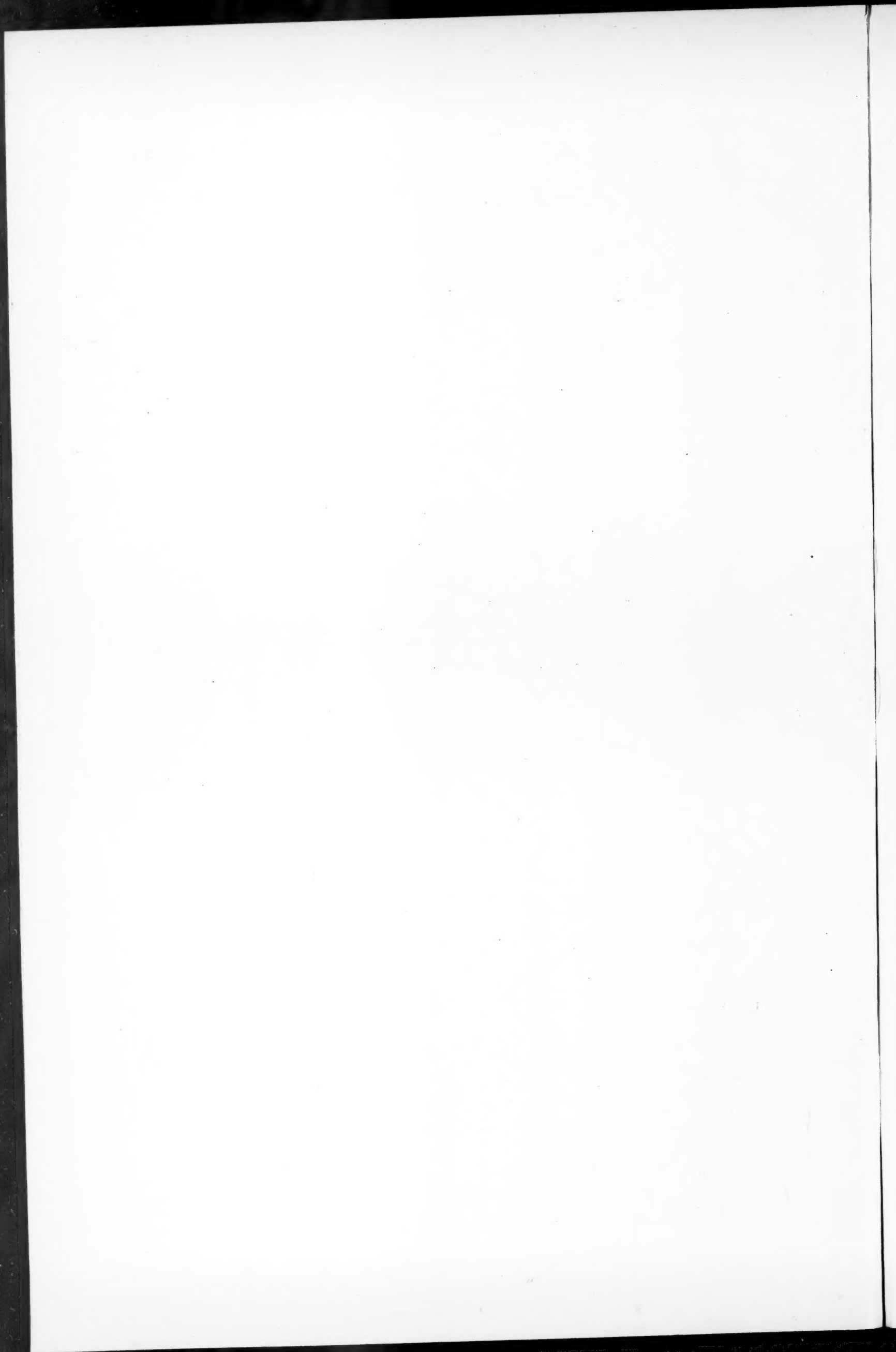


Half Section Through Low-Pressure Cylinder.

Half Section Through High-Pressure Cylinder.



Details of Rocker Arm for Tandem Compound.





lock plank topped with 1-in. maple, tongued and grooved boards.

The building is traversed its entire length by two electric cranes furnished by the Morgan Engineering Co. The larger of these cranes is of 120 tons capacity and is equipped with two sets of electric driving machinery of 60 tons capacity each, one of these having an additional auxiliary hoist of five tons capacity. This crane has a span of 64 ft. and runs on a track laid with 100-lb. rails at a height of 38 ft. 1 in. from the floor. It is capable of lifting and carrying rapidly the heaviest locomotives of modern construction clear of other engines on the pits. The smaller crane, equipped with two 10-ton motors and driving machinery, has a span of 61 ft. and runs on 60-lb. rails, 27 ft. 3 in. from the floor. This crane is used in handling the lighter parts of locomotives during their erection.

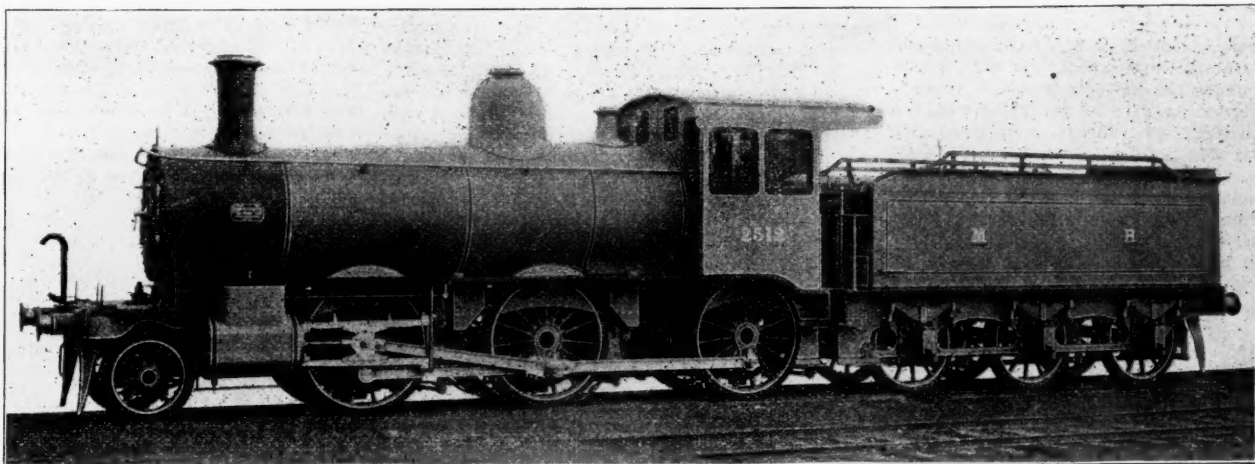
An indirect system of heating and ventilating has been installed. Exhaust steam is passed through a series of iron coils, thereby heating the air which is passed over and among the coils by the suction of a large fan. The fan in turn distributes the heated air through two conduits running the full length of each side of the shop, these conduits admitting the heated air into the building through openings near each of the supporting columns of the building. In this way a continuous circulation of air is assured and the building is amply heated by an effective and economical process.

Among the improvements in use in the new building is the means for disposing of the smoke and vapors formed in firing up and testing locomotives after their erection is complete. For this purpose a smoke duct of brick and cement runs beneath the

Size of steam ports	16 in. x 1 1/2 in.
" " exhaust	16 in. x 3 in.
" " bridges	1 1/2 in.
Valves.	
Kind of slide valves	Allen and American.
Greatest travel of slide valves	5 in.
Outside lap	" " "
Inside " " "	0 in. line and line.
Lead of valves in full gear	1/2 in.
Kind of valve stem packing	United Kingdom.
Wheels, etc.	
Diam. of driving wheels outside of tire	60 in.
Mat'l centers	Cast steel.
Tire held by	11/2 and 3/4-in. screws between all spokes.
Driving box material	Cast steel.
Diam. and length of driving journals	7 1/2 in. dia. x 8 in.
Diam. and length of main crank pin journals	5 in. dia. x 5 in.
Diam. and length of side rod crank pin journals	Front, 4 1/2 in. dia. x 3 in.; back, 4 1/2 in. dia. x 4 in.
Engine truck, kind	2-wheel swing bolster.
" journals	5 1/2 in. dia. x 9 in.
Diam. of engine truck wheels	36 in.
Kind	Cast steel spoke.
Boiler.	
Style	Extended wagon top.
Outside diam. of first ring	54 1/2 in.
Working pressure	160 lbs.
Material of barrel and outside of firebox	Worth "Basic" steel.
Thickness of plates in barrel and outside of firebox	5/8 in., 3/4 in., 1/2 in., 3/4 in.
Horizontal seams, Butt joint sextuple riveted, with welt strips inside and outside.	
Circumferential seams	Double riveted.
Firebox, length	72 in.
" width	31 3/4 in.
" depth	74 1/2 in.
" material	Copper.
" plates, thickness, sides, 3/4 in.; back, 1/2 in.; crown, 1/2 in.; tube sheet, 1/2 in. and 3/4 in.	
" water space, front, 4 in.; sides, 3 in.; back, 3 in.	
" crown staying	Crown bars 5 in. x 3/4 in. welded at ends.
" staybolts	Copper, 1 in. dia. 11 thds.
Tubes, material	Copper.
" number of	244
" diam.	1 1/2 in.
" length over tube sheets	11 ft. 0 in.
Fire brick, supported on	Studs.

of Mr. Virgil G. Bogue and Major T. W. Symons, Corps of Engineers, U. S. A., which names are not found in the actual list of appointees. Leaving those names out of the earlier list and adding two more to the number, making a total of nine instead of seven, gives four new names not heretofore considered, namely, General Ernst, Prof. Burr, Mr. Pasco and Prof. Johnson. General Ernst was serving as Superintendent of the U. S. Military Academy at the beginning of the war with Spain, and was made Brigadier-General of Volunteers. Prof. Burr is well known to a great many of our readers. He was at one time Director of the Rensselaer Polytechnic Institute, then Engineer of the Phoenix Bridge Co., then associated with Mr. Charles SooySmith in private practice in New York City, then for a year at the Lawrence Scientific School at the head of the Engineering Department and latterly has been at the head of the Civil Engineering Department of Columbia University. During his connection with the Phoenix Bridge Co. and while in private practice he did a great deal of important and responsible bridge work, and during all of his college life he has been constantly in practice as consulting engineer and has had to do with a great variety of work and much of it of great importance. Mr. Pasco is U. S. Senator from Florida. Prof. Emory R. Johnson is Professor of Political Economy at the University of Pennsylvania. Of the other gentlemen on the commission we need not speak particularly, as their names have been before the public either as members of the old canal commission or as almost certain to be members of the new one.

It is a matter of gratification that this important commission should be in the main as strong as it is,



Schenectady Mogul for the Midland Railway of England.

floor and extends the entire length of the building close to and parallel with the ends of the several engine pits. In firing up, a workman connects the smoke stack of the locomotive being fired with the smoke duct by a portable exhaust pipe and elbow so that the smoke is drawn off through the duct by the action of an exhaust fan operated by an electric motor. This arrangement is shown by the engraving.

The building is lighted by 22 arc lights of 2,000 candle-power, the current for which is supplied by a Western Electric generator, and at present the shop is taxed to its utmost capacity, and has proved a timely addition to the plant.

#### A Schenectady Mogul for England.

As the reader has heard many times, the Midland Railway of England recently placed an order with the Schenectady Locomotive Works for 10 mogul freight engines and with the Baldwin Locomotive Works for 30 mogul freight engines. We are enabled now to show an engraving from a photograph of one of the Schenectady engines and the descriptive specifications appear below. The 10 engines built at the Schenectady Works have 18 in. x 24 in. cylinders. They carry 89,000 lbs. on the drivers and have 60 in. wheels. The boilers are designed for 160 lbs. working pressure, the total heating surface is 1,255 sq. ft. and the grate area 15.87 sq. ft. Obviously, it is expected that these engines shall burn good English coal. It will be observed that the firebox, staybolts and tubes are all of copper; otherwise the material is about that of ordinary American practice.

Schenectady Mogul for the Midland Railway (of England).

Gage	4 ft. 8 1/2 in.
Fuel	Bituminous coal.
Weight in working order	107,000 lbs.
" on drivers	89,000 lbs.
Wheel base, driving	15 ft. 6 in.
" " rigid	15 ft. 6 in.
" " total	23 ft. 0 in.
Cylinders.	
Diam. of cylinders	18 in.
Stroke of piston	24 in.
Horizontal thickness of piston	5 1/4 in.
Diam. of piston rod	2 3/4 in.
Kind " " packing	Cast iron.
" " " rod packing	United Kingdom

Heating surface, tubes	1,128.87 sq. ft.
Firebox	123.46 sq. ft.
" " total	1,255.33 sq. ft.
Grate	15.87 sq. ft.
" style	Dead bars.
Ash pan	Plain, dampers front.
Exhaust pipes	Single high.
Nozzles	4 1/2 in., 4 1/2 in., 4 1/2 in. dia.
Smokestack, inside diameter, 16 in. at top, 14 in. near bottom.	
" top above rail	12 ft. 9 1/2 in.
Boiler supplied by 2 injectors, Gresham & Cravens, 2886° 91 R. S., 2886° 91 L. S.	
Tender.	
Weight, empty	43,800 lbs.
Wheels, number of	6
" diam.	50 1/2 in.
Journals " and length	5 1/2 in. dia. x 9 in.
Wheel base	12 ft. 3 in.
Tender frame	Steel plate.
" Wheels on axles in pedestal boxes.	
Water capacity	6,250 imperial gals.
Coal	6 (2,240-lb.) tons.
Total wheel base of engine and tender	43 ft.
Engine equipped with combined steam and vacuum brake, Midland Ry. st'd., 2 1/2-in. Consolidated safety valves; K. & M. magnesia lagging on boiler and cylinders.	

#### The Isthmus Canal Commission.

We have again to announce the appointment of the commission to consider and report upon a canal across the Isthmus. Two or three weeks ago we gave the names of the commissioners on authority which seemed reliable, but in the list which we then published there were two errors; that is, one name appeared which does not appear in the final list, and the number of commissioners there reported was seven, while, in fact, nine have been named. The commission as announced last Friday consists of:

Rear Admiral John G. Walker, U. S. N. (Retired).  
Colonel Peter C. Hains, Corps of Engineers, U. S. A.  
Brigadier-General Oswald H. Ernst, U. S. V., Lieut.-Col. Corps of Engineers, U. S. A.  
George S. Morison, New York.  
Prof. William H. Burr, Columbia University.  
Alfred Noble, Chicago.  
Samuel Pasco, Florida.  
Lewis M. Haupt, Philadelphia.  
Prof. Emory R. Johnson, University of Pennsylvania.  
In the list which we printed before were the names

and it is reasonable to hope that with the ample money at its command it will make the final report on the engineering and commercial aspects of a canal across the Isthmus. The political side of the matter is out of the province of this commission, and is of great importance and may indeed be of controlling importance finally.

#### The Modern Accounting Office.

By S. E.

The word modern is used advisedly, not, however, because the perfect office is yet anywhere fully realized, but because no fact is more patent than the change within the last two decades in the status and methods of the accounting office. Perhaps no department of the railroad service has had so long and discouraging a struggle for its proper recognition. The Auditor was first no better than Superintendent's clerk. When Edgar Thomson had got enough of the Pennsylvania Railroad built to set up a regular operating organization he called in his assistant, Herman Haupt, who later became the great engineer, and sent him out over some of the little railroad lines in Massachusetts to look into their methods of reports and accounting. From these General Haupt drew up his own system and out of this has grown the great accounting office of the Pennsylvania. The blanks were passed over to Mr. Thompson at the next desk, O. K'd without examination and adopted straightway by the Board of Directors. General Haupt became Superintendent and turned the accounting work over to a subordinate.

In other places the Auditor was the subordinate of the Treasurer. No organization more ludicrously illogical could have been devised. Yet this for a long time was the plan on the New York Central, and the idea still exists in the organization of the United States Government auditing offices, which are under the Secretary of the Treasury. And short shrift, in those early days, was made of the auditor or accountant who had the temerity to conceive that his functions were of any importance. On more than one of the great railroads of to-day the ac-



counting was little more than keeping the Treasurer's cash book. No moneys were accounted for until they had passed into the Treasurer's hands, and the only liability entry was disbursements. Blunt old Commodore Vanderbilt, from whom so many precedents in railroading date, had little use for anything more than the cash book.

Nor are those times so far removed, as it was only in the very last few years that a Maryland road was discovered to have no more accounting than this. But on the great systems, from the necessities of the situation, the accountant has left the days of the cash book well behind. That the evolution has been slow is due partly to the entirely new conditions which extended operations have brought about, and partly to the accountant himself, the effect of whose environment and mental occupation was to

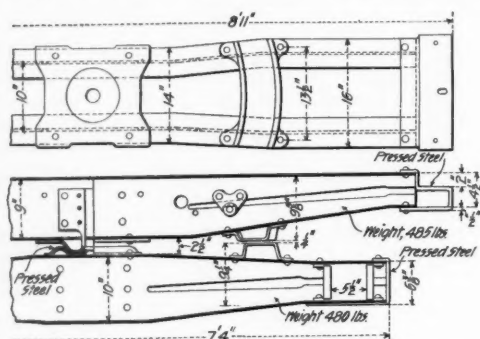


Fig. 1.—Bettendorf Bolsters for 70,000 Lbs. Capacity Coal Cars.

confine his view and withdraw him from the larger conception of railroad operations. He was essentially a man of details, and details, too, that were too often unrelated to general principles and accorded little weight by railroad men generally. When the great Auditor of the Lake Shore & Michigan Southern, Mr. Leland, died a few years ago, this was especially emphasized in the encomiums passed upon him by his associates. The President spoke in unmeasured praise of his faculty for detail, but there was no recognition of a masterful grasp of the whole. The Auditor reviews the acts of others. This function is essentially judicial. It demands the power of weighing evidence. It is to be admitted that such conception is only very indifferently entertained. Too often auditing is construed to be no more than the mere routine checking of additions and extensions on statements of account that are accepted on the basis of designated signatures, which the auditor has not the authority to challenge. The whole matter goes back to the fundamental question, What is the Auditor?

The Auditor is the custodian of the inventories and records of the property. By embodying a transaction in his records, he places the final seal upon it and incorporates it permanently with the property as an asset or liability. It follows that he must assign a description to and determine the relation with reference to the property as a whole, of receipts, disbursements or transfers of any kind whatsoever. Thus he must be capable of discriminating between a proper charge to revenue and a charge to capital account. He is the only proper judge of the powers delegated to the several departments by the by-laws. It will be recalled how Comptroller Bowler, of the United States Treasury, some few years since declined to recognize any power to reverse his interpretation of the law, outside of the courts themselves. All accounts within the respective powers delegated to each department are within his province to survey, to measure against generally approved standards, and to call into question so far as to enable him to intelligently describe and measure them. In movements affecting

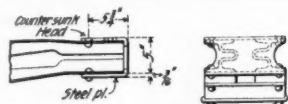


Fig. 2.—End Connection.

such parts of the property as are directly negotiable, such as cash, the organization is so adjusted that his record must be first made, and the seal of approval thus given before the movement is authorized. Thus no disbursements of cash are made except upon his order. It follows that his authority necessarily extends to questioning or refusing approval of grossly improper charges, regardless of what authority they come from. He may decline to authorize a price from the purchasing agent, an irrelevant contract by the Chief Engineer, a grossly unnecessary expense by the Transportation Department, or perhaps even a confessedly reckless policy by the Traffic Department. Incidental to his determination of the propriety of a charge, he must be supplied with full data by which to measure and judge of every exercise of authority which comes within his scope to review. Every facility in the way of access to records, files of traffic contracts,

transportation contracts, explanation of customs, usages, special conditions or general policies, should be afforded to aid him in arriving at true measures and a correct judgment in classifying and describing what is done. The Auditor is called upon to certify to his records of which he is the custodian, and in order to do this consistently he should be in position to verify his records from actual knowledge. It is in this sense that the accounting officer is the "Controller." Not a single act throughout the length of the entire property, so it affects the values of the property or changes the form or location of any parts of the property, but should be reported to him, that he may incorporate its effect in his records, which are the counterpart and description of the physical property. He cannot prohibit things which his judgment does not approve, but he can refuse to give validity to such transactions by declining to incorporate them in his records.

It will be seen that such an officer has no power of initiative. He is essentially a court of review. He does not collect nor disburse cash, run trains nor build roadway, nor buy supplies, but his survey includes all these. It is confined to no single department or grade of service, but extends to every part and condition of operation. The astute President of the Great Northern has been quick to recognize the opportunity thus afforded for insight into operations and he has made the office the apprenticeship to the operating department. But, should the judicial part of the organization trespass on the executive, to make it too inelastic, there is trouble. The Auditor is trustee for the owner, the directors or the President, whichever be the appointing power. It is not wise for the owner to interfere with his manager too far. Latitude must be given to carry out larger policies that cannot be subjected to strict construction in every part, but must be judged in their entirety. The Auditor must be a sufficiently broad and practical man never to become a mere obstructionist. He should be in closest accord with the man of action, appreciating fully his difficulties and looking ahead eagerly to his achievements.

The importance of honest and intelligent accounting becomes greater as properties become larger, because then it is only by accounts that the complex situation can be summed up and stated. The bookkeeping scandals reported on two great systems have greatly emphasized this. But unfortunately for the accounting officer the tendency has been to call in expert accountants to perform the function for which he was employed. The effect

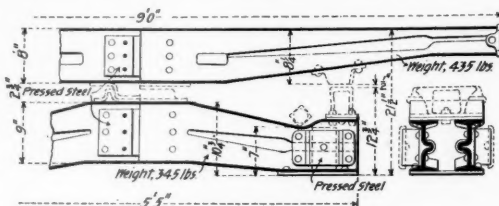


Fig. 3.—Bettendorf Bolster for Swing Motion Truck.

of their frequent examinations is to make him a mere bookkeeper, who prepares accounts for experts to audit. In some quarters there is the feeling that the Auditor has not been equal to his opportunity. Either from his own inadequacy or from causes beyond his control, he has not been able to command the confidence which he should and has to give over part of his functions to the outside expert, who comes in to make an examination of the property. It is perhaps too early to say that this will be the outcome everywhere, but Auditors must see a very definite tendency in this direction. Just so far as the pharmacist stocks his shelves with proprietary articles, he retires himself from the business. The principle has equal application to the accounting officer. By the laws of natural selection the proprietary article may justify its necessity, but there would seem to be no reason why the Auditor should let slip what is his by prescriptive right and also by right of superior opportunity and fitness.

#### Some Recent Bettendorf Car Bolsters.

The accompanying illustrations of some recent Bettendorf car bolsters show how the original design, published in our issue of June 11, 1897, has been modified, and how this type of bolster can be made to suit a wide range of conditions. Originally the I-beams were reduced near the ends, first, by a corrugation of the web, and second, by cutting out a section of the web in such a manner that the upper and lower parts of the web would interlock when heated and pressed together. It was found later that this second operation, that involved the cutting of the web, could be entirely dispensed with, and that by using heavy presses I-beams could be worked cold into a variety of shapes. This change not only reduced the cost of making the bolsters and increased the capacity of the plant, but removed any danger of the steel being injured by improper heating.

Another modification has been the substitution of

pressed steel shapes for malleable iron castings; this change resulted in a reduction of the number of parts as well as of the weight of the bolster. It was also found that the rivet spacing could be revised so as to make a smaller number of rivets answer the same purpose, and this has been done. As the majority of railroad men seemed to prefer the ordinary rivets to the tubular ones used with the first bolsters, recent Bettendorf bolsters have been made with solid rivets in the usual manner. It might be said, however, that so far as used the tubular rivets seem to be suitable for this purpose, and the makers consider that they have some advantages.

The engravings were made from the working drawings of bolsters now in service, the drawings being selected with a view to showing different forms. Fig. 1 is a good example of the adaptability of the

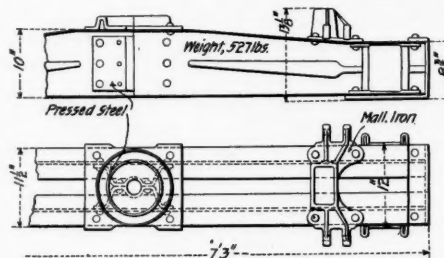


Fig. 4.—Bolster for Queen & Crescent Line.

I-beam construction, and shows how an unusual set of conditions was met. It was required to maintain a fixed location of the sill bolts and a fixed length of draft sills, while the side sills of the car had 2 in. greater depth than the others. It will be seen that the body bolster is made 14 in. wide at the center and 16 in. wide at the ends, and that the side sills are carried on pressed steel brackets which also act as end plates. The center and side bearings and column guides are of pressed steel.

Fig. 2 shows the usual end connection for the body bolster, and how the webs of the I-beams are corrugated.

In Fig. 3 is shown a short swing motion truck bolster designed to interchange with wooden bolsters; this required that the beams be pressed into a peculiar form. Fig. 4 shows a truck bolster with the offset of the beams entirely from the top, and in this case the side bearings and brake hanger brackets are cast together; this has the latest form of end connection. Similar bolsters have also been made with the offset entirely from the bottom. The bolster in Fig. 5 is used with the Standard truck, in which the bolster rests on rollers at either end; in this particular case the arch bars were unusually low.

These bolsters are handled exclusively by the Cloud Steel Truck Co. The plant at Davenport, Ia., where they are made, is one of the largest of the kind in the country, having 38 hydraulic presses ranging in capacity from 200 to 1,800 tons.

#### To Young Engineers—Writing for the Press.

If writing for publication choose first a good journal. A simple test for determining the relative value of publications is to search their files for information on a given subject; the difference is surprising. A paper which on casual examination appears to be replete with interesting matter, will, on making a search as indicated, often prove to contain but few of those facts that are of importance and which one really wants to know.

The contributors to technical journals may be roughly divided into a number of classes. The first class comprises those who, by original research or exceptional facilities for observation, have secured some facts, and if an investigation has been made to

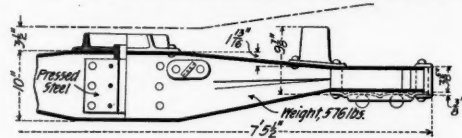


Fig. 5.—Bettendorf Truck Bolster Used with Standard Truck—70,000 Lbs. Capacity.

see what others have done along the same or similar lines, an acceptable and readable article is the result. If the author does not take the precaution to look up the literature on the subject, some critic will, and the outcome may be humiliating.

In the second class may be placed those who lack the opportunity for securing original data, and must take the facts of others, which are compared, sifted, and combined, and conclusions drawn. If the compiler is competent and does his work with care he deserves to rank with the original investigator.

Thirdly come men who have a hobby or a questionable patented device to exploit, and fourthly, those who write merely to fill space. The less said of these classes the better; let a young man be not of them.

If a young engineer is so situated that he can contribute to the technical press as a writer in either of what are here called the first two classes, it will be of distinct advantage to him to do so. He acquires the ability to express himself well; he learns to think straight (or he is quickly found out); he will become known to his future clients. The discussion which may arise on the subject will be at comparatively short range, because publication is not delayed for weeks or months; an inexperienced writer is given a better chance to consider any reply to questions and criticisms than is offered in oral de-



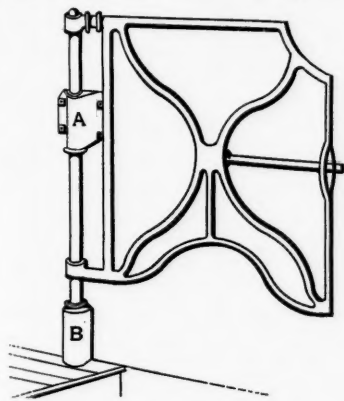
bate at a society meeting; moreover the men who take part in such discussions do so because they are interested in the subject. Lastly, the pecuniary reward is not to be despised.

As a preparation for his future work a young engineer cannot do better than to become a close reader of the current periodicals which have for their field his chosen profession. Let him follow the discussions and if possible take part in them; in order to do this with credit to himself, he must become familiar with the subject, and having once mastered it will easily recognize it when after a period of eight or ten years that same subject appears again thinly disguised and heralded as something that is really new. Many questions have a way of reappearing at more or less regular intervals, so that the elders of the profession have met most of them more than once.—Daniel Royse, in the Purdue Exponent.

#### Crone's Pneumatic Car Gate.

We show a new car gate patented by S. A. Crone, lately Assistant Superintendent of Rolling Stock of the New York Central & Hudson River, which is now being put on the market by the R. Bliss Manufacturing Co. of Pawtucket, R. I., makers of the Wood car gate.

The Crone gate is worked by a simple valve, in the cab of the locomotive. The air is supplied through



A, Worm Casting; B, Piston.  
Crone's Pneumatic Gate for Cars.

a  $\frac{3}{8}$ -in. pipe under the car, and turning the valve to the right or left opens the gates on the corresponding side of a train.

The air pressure acting on a cushion valve under the gate post raises it and the gate is made to open by means of a lug on the post working in a worm casting by which the gate is fastened to the car. When the air is released the gate closes by its own weight. The gate can also be worked by hand, independently of the air.

The Crone gate has been in service on a six-car train on the New York Central and Hudson River Railroad between New York and Poughkeepsie for nearly two years past, which has demonstrated its practicability. It is designed for steam and elevated service.

#### Simplex Bolsters for 80,000 Lbs. Capacity Coal Cars.

The accompanying engraving shows the details of the bolsters and truck used by the Hocking Valley Ry. with 2,000 new coal cars of 80,000 lbs. capacity. One thousand of these cars are now building by Barney & Smith, Dayton, O., and 1,000 by the American Car & Foundry Co., at Detroit; the bolsters were furnished by the Simplex Railway Appliance Co., Chicago.

It will be seen that the center and intermediate sills are 5x9 in., and the outside sills 5x12 in. The greater depth of the side sills is provided for by a modification of the usual end casting, which forms a shelf upon which the sill rests. This casting also extends up alongside the sill and completely fills the space between the side and first intermediate sill, forming the saddle for the outside truss rod. This makes a strong construction and prevents tilting of the side sills. All sills are gained  $\frac{1}{2}$ x12 in. above the body bolsters.

The body bolster as shown by the engraving is 9 in. deep at the center and is built up of a  $\frac{3}{4}$ x12-in. top, and a  $\frac{3}{4}$ x12-in. bottom plate, with a filling piece between made of plates and angles. The truck bolster is 14 $\frac{1}{2}$  in. deep at the center and consists of a 12-in. steel channel for a compression member, while the tension member is a  $\frac{3}{4}$ x10-in. steel plate. The spring plank is a 13-in. channel. All the castings shown are of malleable iron.

The truck frame is of the arch bar type, the upper bar being 1 $\frac{1}{2}$ x4 $\frac{1}{2}$  and the lower bar 1 $\frac{3}{8}$ x4 $\frac{1}{2}$  in.; the tie bar is  $\frac{5}{8}$  in. thick.

#### Arkansas Railroad Commission.

The Railroad Commission of Arkansas, which was created by laws passed March 11 and April 15, has established an office in Little Rock and has issued a pamphlet containing rules for the guidance of persons having business before the Commission, and a copy of the law.

The railroad and express companies have been or-

dered to file rate sheets with the Commission, and, according to the law, the Commission must revise these if necessary to establish just rates. The law contains regulations concerning posting of tariffs, giving bills of lading and making annual reports to the Commission. Discrimination, pooling and violation of the long and short haul principle are forbidden. The law directs the Commission to ascertain the cost of construction of each road in the state and to make an estimate of what it would cost to replace all its physical property. The Commission is empowered to compel the attendance of witnesses and to punish for contempt. It may temporarily employ experts when necessary.

The Commissioners are Robert Neill (Chairman), Jeremiah G. Wallace and Henry G. Wells. Their salaries are \$2,500 each. The Secretary is Charles S. Collins; salary \$1,500.

#### Detection of Color Blindness.

Dr. E. W. Scripture, Director of the Psychological Laboratory of Yale University, in a paper published in Science for June 2, describes an apparatus which he has devised for not only detecting color blindness but for detecting other color weakness, where there is not a complete insusceptibility to any color. The apparatus is said to require but a small fraction of the time required to make the wool test. It has been used for some time on the New York Central and is said to have detected defects in the vision of men who had got through the wool test all right.

Mr. Scripture says that he has among his students one who is absolutely perfect at the wool test, but who is, nevertheless, color blind. His eyes are abnormally acute for differences in color, but he has only two fundamental sensations instead of three. A second student has perfect color vision for objects near by, but is practically color blind for objects which are distant or are weakly illuminated. To discover these classes of persons, says Mr. Scripture, it is necessary not merely to have them sort shades of some color, but to name certain fundamental and familiar colors.

The instrument described is similar in appearance to that described by Dr. Williams, of Boston, in the Railroad Gazette of Oct. 8, 1897, though very much smaller. Two disks, about six inches in diameter, are fixed on a single axis, supported by a convenient handle for holding the whole instrument in one hand. One disk has three openings, in which are gray glasses, the first one being a very dark smoked glass, the second a ground glass (perfectly white) and the third a light smoked glass. The other disk, revolving behind the first one, has 12 openings, filled with different colored glasses, which, by revolving the disk, may be brought in line with either one of the three openings in the front disk. Thus 36 possible combinations are provided for. The 12 glasses are mainly reds, greens and grays. By having the openings numbered, an examination may be made by any person with the requisite intelligence to correctly record the numbers and the names given by the person being tested, to each color shown to him.

Trainmen are said to like this method because it seems to them more like the signals they encounter

freight cars and locomotives; Acme vestibul for passenger service, and the Acme buffer platform and steel underframing.

Adams & Westlake Co., Chicago, Ill.—Headlights, signal lamps and car trimmings.

American Brake Beam Co., Chicago, Ill.—Samples of Kewanee and Vesuvius brake beams.

American Brake Co., St. Louis, Mo. (Westinghouse Air Brake Co., Lessees).—Models showing locomotive truck brake, with automatic brake slack adjuster.

American Brake Shoe Co., Chicago (Licensees The Sargent Co., Chicago, Ill.; Ramapo Iron Works, Hillburn, N. Y.; Parker & Topping, St. Paul, Minn.).—Diamond S brake shoes.

American Dust Guard Co., Columbus, O.—Samples of the Timms dust guard.

American Grain & Car Door Co., Philadelphia, Pa.—A full size car grain door.

American Machinery Co., Grand Rapids, Mich.—Three sizes of Oliver wood trimmers.

American Mfg. Co., New York City.—Two full size Peerless M. C. B. car couplers and models showing method of working. The Peerless coupler was illustrated and described in our last issue.

American Steel Foundry Co., St. Louis, Mo.—Models of car trucks.

Atlantic Brass Co., New York City.—A few samples of A. B. C. journal bearings of different sizes, some of which have been in service for a considerable time. In one of the bearings exhibited the brass has worn to the thickness of paper, showing that the steel back gives perfect support.

Automatic Air & Steam Coupler Co., St. Louis, Mo.—Full size and small working models of an automatic steam and air brake hose coupling.

Baltimore Ball Bearing Co.—Norwood ball side bearings.

F. W. Bird & Son, East Walpole, Mass., and Chicago, Ill.—Model of a section of a freight car roof, showing the application of the Torsion Proof freight car roof.

The R. Bliss Mfg. Co., Pawtucket, R. I.—Full size models of five different patterns and kinds of gates for railroad cars, including the Wood patent car gate as used on the New York, New Haven & Hartford, Boston & Maine, Chicago & Alton, Chicago & West Michigan and other railroads and on a number of street railroads, and the Crone automatic air gate for steam surface and elevated roads.

Boston Artificial Leather Co., Boston, Mass.—Four car seats upholstered in moroccoline, a substitute for leather.

Boston Woven Hose & Rubber Co., Boston, Mass.—Vim air brake hose and a line of mechanical rubber goods.

M. M. Buck Mfg. Co., St. Louis, Mo.—Pelham driver brake release, Brooks car chains, Wells signal lamps, Frahm metallic flags, Perfection oilers, Cochran wrenches, Frahm lamps and caboose signal fixtures.

Butler Drawbar Attachment Co., Cleveland, O.—New tandem drawbar attachment.

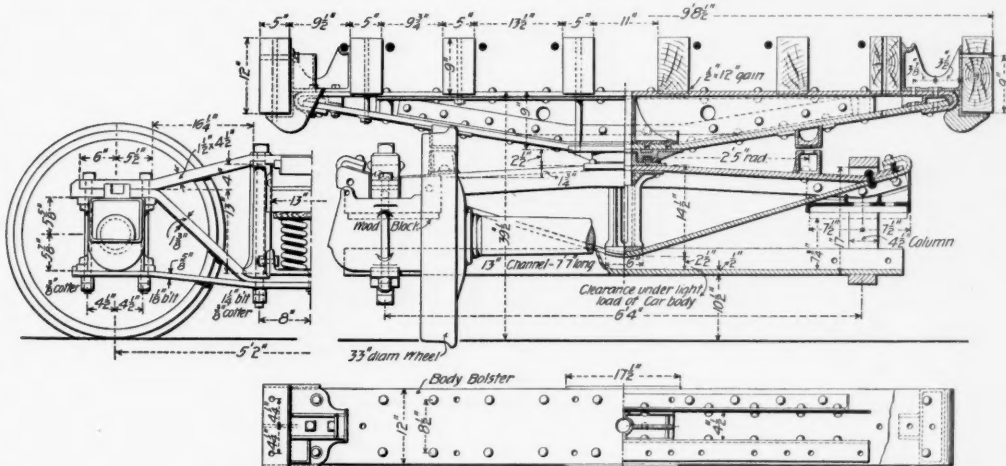
Carborundum Co., Niagara Falls, N. Y.—Carborundum wheels and specialties of cloth and paper.

L. C. Chase & Co., Boston, Mass.—This company has its usual fine display of the famous Goat Brand plain and frieze mohair car plushes manufactured by the Sanford Mills of Maine.

Chicago Grain Door Co., Chicago, Ill.—Full size models of the Chicago rabbetted grain door and security lock brackets.

Chicago Pneumatic Tool Co., Chicago, Ill.—The exhibit of this company was located on the beach near the Hygeia Hotel. It occupied considerable space on an especially built platform and nearly all the different appliances made by the company were shown working. These included Boyer pneumatic hammers; Boyer and Whitelaw drills; pneumatic riveting machines; pneumatic hoists and jacks; Boyer piston air drills; Chicago and Boyer breast drills; Boyer pneumatic riveters; Boyer casting cleaners; Boyer speed recorders; Chicago flue rollers and cutters; Whitelaw reversible drills, wood boring machines and bolt nippers; pneumatic flue welders, flue expanders, staybolt tappers and nippers and rivet heating forges; air motors, self-closing hose couplers; pneumatic tamping machines for foundries and pneumatic painting machines.

Chicago Railway Equipment Co., Chicago, Ill.—A number of standard frictionless slide bearings, some of which have been in service. One bearing was removed from the Pullman car Clematis of the Pennsylvania Limited between New York and Chicago after having made a



Simplex Bolster for 80,000 Lbs. Capacity Coal Cars—Hocking Valley Ry.

in actual service. Not being required to name unfamiliar colors, gives the men a feeling that the test is a fair one.

#### Exhibits at the Mechanical Conventions.

As in 1897, the greater part of the exhibits are located in the palm garden and courtyard of the Hotel Chamberlain, although most of the larger exhibits, including the cars of the Pressed Steel Car Co., and the Goodwin Car Co., and the cars equipped with Buhop couplers and the exhibits of the Chicago Pneumatic Tool Co. and Fairbanks, Morse & Co. are on the grounds around the Hygeia Hotel.

Following is a complete list of the exhibits in place Wednesday morning:

Acme Railway Equipment Co., Easton, Pa.—Full size models of the Acme M. C. B. couplers for passenger and

freight cars and locomotives; Acme vestibul for passenger service, and the Acme buffer platform and steel underframing.

Cloud Steel Truck Co., Chicago, Ill.—Cloud steel pedestal truck of 30 tons capacity; Cloud pressed steel arch bar truck of 40 tons capacity and several forms of Bettendorf body and truck bolsters.

Consolidated Car Heating Co., Albany, N. Y.—Model showing the Consolidated system of heating cars under pressure.

Crosby Steam Gage & Valve Co., Boston, Mass.—Water-back locomotive steam gage; muffled and plain pop safety valves; renewable seat whistle valve; Crosby steam seat globe and angle valves and Johnstone blow-off valves.

Davis Pressed Steel Co., Wilmington, Del.—Five full size models of the Davis pressed steel journal box fitter with metallic dust guards.

(Continued on page 434.)





ESTABLISHED IN APRIL, 1856.  
PUBLISHED EVERY FRIDAY,  
At 32 Park Place, New York.

#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

A topic for piazza and lobby discussion at the conventions has been suggested to us by a superintendent of motive power whose name, unfortunately, we cannot make public. Like most of his kind, he is retiring. He proposes that the associations, or the consolidated association, if it becomes such, should make Saratoga its permanent headquarters. A building should be put up there for a permanent exhibition and which also should contain the offices of the Secretary. At the time of our conversation the research laboratory matter had not got far above the horizon, otherwise our friend would probably have suggested that this laboratory be also established in the Saratoga building. He tells us that the city of Saratoga would help liberally in land and building. The first and most obvious reason for such a step is that Saratoga is probably, take it all in all, far and away the best place in the United States for large summer conventions. The hotel accommodation is ample and good, the temperature is likely to be reasonably cool, the place is quiet and pleasant and nowhere else can the great conventions find so many conveniences united. This, we believe, would be the judgment of nine-tenths of the members of the associations. Another argument of some importance is that by making the exhibition permanent a great deal of the cost of carrying things back and forth and installing the displays would be saved, and this is a serious burden on the supply men. An obvious objection to the scheme is that while Saratoga is all right for conventions, it is off the line of travel, and the Secretary would be likely to see many weeks go by without a visitor, and the permanent exhibition would probably be seen by very few people indeed except at convention time; although a few railroad officers, capitalists, etc., might drop in to see the show and talk with the Secretary at odd times during the summer. We do not pretend to have considered the project carefully enough to have any settled opinion about it, but at any rate it is worth the thought of the members of the associations.

#### The M. C. B. Coupler and the Association.

The report of the committee on M. C. B. couplers is a very fine document. Obviously, a great deal of work has been done on it. The analysis of the various defects in line—original and due to wear and to distortion in work and under test—is more complete than any that we have ever seen. This was made possible by the method followed under the direction of the committee, which comprised not only drawing-board work, but the actual construction of templates on the original lines of the various couplers and on the defective lines, and then trying them together. This careful analysis gave the committee solid ground on which to build up a set of recommendations of obvious value.

The committee did not rest content with the in-

effectual method of trying to get information by circular. If it had done so it could never have prepared the report which is now submitted. The opinions which it did procure were often exactly opposed to each other. Thus, one man would have no specifications or tests, but let the coupler question work itself out. Another man says that the specifications and tests cannot be too severe. One man says that the drop test has never discovered anything, while another man says that it is due to the drop test that couplers have been brought to the present state of perfection, and that it is the only satisfactory way of testing couplers. But in this matter of the use of circulars in preparing reports the fundamental difficulty is not so much that people express contrary opinions as that they do not answer at all, or answer so vaguely that one cannot tell what they mean.

But the coupler committee took a great deal of pains to get into personal relations with people having opinions and information and to extract from them their real opinions. Not that the committee did so much of this work itself as that it was able to delegate much of its detail work to competent hands. This method of getting at the knowledge and sentiment of railroad officers is in line with what we have suggested elsewhere in writing about the car wheel report. Naturally, this way of preparing reports is laborious, and it is only possible when some man or men of intelligence can give a good deal of time to it.

Evidences of serious study are discernible all through the report, and the committee makes a set of recommendations which, if adopted and lived up to, will help matters very much. All of the recommendations are important, and as they should be read carefully, along with the various appendices in which the ideas of the committee are developed, and as they appear elsewhere in this issue, we shall not repeat them here. One of the most important of these is to increase the length of the guard arm, but the recommendation for the use of a twist gage for new couplers is also very important, as is that for the use of a gage with new knuckles bought for renewals and for the careful use of the modified gage showing the limit of wear.

The committee does not do what a good many people had hoped; that is, attempt to restrict the permissible couplers to a few standard makes. It expresses the belief, however, that rigid specifications and tests will weed out the poorer makes of couplers, and it recommends the appointment of a standing committee with the duty of testing couplers.

A correspondent who wrote in the Railroad Gazette, June 9, page 399, suggests that the first action of the Association should be to declare that all couplers in use, to the extent of 100,000 or more, be immediately known as standards of the Association, and that all couplers purchased for replacement and for new cars should be selected from among these standard varieties. But he suggests further that the standing committee to be appointed should have power to examine couplers and authorize their use as standards, even if such couplers are not now used on 50,000 cars. The same correspondent makes a number more of very carefully considered and very sensible suggestions.

It is not necessary for us to repeat now what we have so recently said on this proposition to limit the acceptable couplers to half a dozen or so standard makes. Probably it would be an excellent thing for the railroad companies if this could be done. Probably, however, it could not be done, for reasons which we have already expressed.

#### Steel Tired or Cast Iron Wheels.

On April 7, in speaking of the committee of the Master Mechanics' Association on the relative merits of cast-iron and steel-tired wheels, we said: "We are prepared to hazard the prediction that the committee will report that chilled cast-iron wheels can be produced at a price and of a quality which would put steel-tired wheels out of the competition if the question were settled on a square consideration of the merits of the two." That innocent remark raised something of a hubbub and has been the text of several letters which have appeared in the Railroad Gazette since. The prediction was gratuitous and it was wrong. The committee has not said the things which we expected it to say. It does say that it is not able to decide certain vital points "from the facts presented." The qualification, "from the facts presented," is important. The committee asked for information in the usual way, by a carefully drawn circular. It received answers from very few railroads. Two of these railroads

gave specific information as to miles run and cost of mileage. Those two railroads were somewhat bound to give such information because the heads of their respective rolling stock departments were members of the committee. Two other roads gave a little general information. The other replies were in the nature of regrets. Obviously, if the committee felt bound to confine itself to "the facts presented" by the members of the association it could not make a decided and specific report on the small amount of data collected. The committee very properly says "conclusions on this subject should be based on facts and not on unsubstantiated opinions."

It is the belief of the committee that "the various members of this Association possess much more information, both as to trackage and cost, than they have been able to present." We have no doubt of this, nor have we any doubt that the members of the committee possess more information than they themselves present in the report, and have more positive opinions than they there express. Probably, however, it was their duty as custodians of great interests to say no more than they did say on the evidence which they were authorized to bring forward or were able to bring forward. Indeed this question is one which is a good deal complicated by commercial considerations. It is not an easy thing for a railroad officer to present a sharp, clear cut and quotable opinion on this subject without danger of hurting somebody's commercial interests. We do not pretend to intimate that the officers of the railroads have failed in any duty in not telling more of their experience with various wheels. That must be a matter of individual judgment. That being so, it is not at all certain that any committee can get much more evidence by circulars than the committee of this year has secured. It is possible that the only way to get the evidence will be to go about and talk with railroad men and procure by conversation and by correspondence the summing up of their records and opinion and then present the matter on the responsibility of the individual or the committee who does the work. Perhaps the best way would be for somebody to take it up as an individual enterprise and dig out and publish the truth and take the consequences.

But there is a good deal of real evidence in the report and some valuable opinions, and we shall publish it next week; the proper restrictions of the associations forbid our saying anything more definite now about this report. In considering what we have said in the past and what we may say in the future about car wheels, it must be kept in mind that there are good cast-iron wheels and very poor ones, and there are good and bad steel wheels. We suppose, however, that the difference between the best and the worst cast-iron wheel is greater than the difference between the best and the worst steel-tired wheel. It follows, perhaps, that it is easier to buy a dangerous cast-iron wheel than a dangerous steel-tired wheel.

Our contention has long been this, and only this: It is possible and even easy to buy a cast-iron wheel that is practically safe, and that such a safe cast-iron wheel will be a good deal cheaper than a steel-tired wheel which is equally safe. This is the assertion which we wish to see proved or disproved. We do not consider that the burden of the proof is on us, but that it is on those who are responsible for the safe and economical working of the railroads.

#### The Tandem Compound.

The new tandem compound of the Atchison, Topeka & Santa Fe, described in this issue, is doubtless the most interesting locomotive that has appeared since the last convention. Many freight engines recently built have great weight, but in these cases the old lines of construction have been so closely followed that the work of the designer has principally been that of enlarging the parts of some existing type of locomotive. But Mr. Player's design is different, and especially in so far as it relates to the cylinder and valve arrangement, involves many new and interesting features.

It is strange that so little attention has been given to the development of the tandem compound in this country. In 1883 the Boston & Albany built an experimental tandem compound which was changed to a simple engine after a short trial, and the Brooks Locomotive Works built two tandem compounds in 1892; with these exceptions nothing of any importance has been done previous to the building of the new Santa Fe engine. This seems the more strange as the tandem has long been a popular type of compound in France and other continental countries of Europe.

Without going into a long discussion of the claims



made for and against various cylinder arrangements of compound locomotives, a few facts may be noted.

In the two-cylinder arrangement the limit of width over the cylinders has been reached in certain instances. For this reason heavy freight engines with single expansion cylinders have been built within the past year for roads which preferred the two-cylinder compound, but could not use it because a suitable low-pressure cylinder would extend beyond the clearance limits. The largest low-pressure locomotive cylinder of which we have record is 35 in. in diameter, and probably this is very nearly as large as can be used. It would therefore seem that for big freight locomotives the choice must lie between some form of four-cylinder compound and single expansion cylinders.

Of the outside four-cylinder arrangements, which have been found practicable, there are the Vauclain, and tandem types. The tandem arrangement is not nearly so compact as the Vauclain, but in the nature of things it has an advantage in that the piston rods on each side are in a direct line and no turning moment is set up at the crosshead when the total pressures in the two cylinders are unequal; this advantage of the tandem is of most importance in starting. Both the tandem and Vauclain types have a common advantage over the two-cylinder compound in that the distribution of the power between the two sides is as nearly equal as in a simple engine. It would not be surprising if, in view of these things, the tandem compound should receive more attention in the future, and we believe Mr. Player is already building such a locomotive for passenger service.

The record of the performance of the new tandem freight compound of the Santa Fe is probably the most complete information so far published regarding this type of engine, and there are several features of the comparative test with the simple engine to which we would direct attention. The locomotives compared were practically alike with the exception of the compounding features, the boilers and boiler pressures being almost identical, and the driving wheel weights about the same. All the tests were made on a single division, under the direction of a competent engineer, and the engines hauled similar trains. The weather and wind conditions were probably as nearly constant as could be expected in a road test, but these always happened to be more favorable for the simple engine; the simple engine was further favored as to the temperature of the feed water, and it is apparent that these factors materially improved the performance of the simple engine. The compound, however, made a better showing than might have been expected.

As to the starting power of the compound, we are told that it has repeatedly been brought to a full stop at such places as the sharp ascent west of Dover and upon Nine Mile Hill, between Colmor and Levy, and has been able to start trains weighing more than 800 tons, exclusive of the weight of the engine and tender. At the last point named a start was made, where in addition to the grade there was a six-degree reverse curve. Of course, these starts were made when the locomotive was worked as a simple engine by admitting steam at reduced pressure direct from the boiler to the low-pressure cylinders.

Regarding the indicator diagrams from the compound, it should be noted that throughout the usual working range of cut-off, the work done is fairly well divided between the high and low-pressure cylinders. Thus, for diagrams Nos. 2, 3, 6, 7 and 10, when the travel of all valves was equal, the power developed in the low-pressure cylinder was 56.4, 57.4, 57, 55.8 and 55.5 per cent. respectively of the total indicated horse power. With the shorter travel of the high-pressure valve, similar ratios for diagrams Nos. 13, 14, 16, 17 and 18 were 54.3, 53.9, 52.3, 54.9 and 53.3 per cent. Diagram No. 9 of the compound, taken when live steam at reduced pressure was admitted direct to the low-pressure cylinders, shows that more than 75 per cent. of the total power was developed in the low-pressure cylinder under those conditions. With the tandem arrangement of cylinders this is not objectionable.

In a future number we hope to give some further data showing how the size of trains has been increased on the Atchison, Topeka & Santa Fe since the heavy locomotives were put in service.

#### Annual Reports.

Chicago, Rock Island & Pacific.—The annual report of the Chicago, Rock Island & Pacific for the year ending March 31, 1899, is at hand. During that year the miles operated amounted to 3,619.37. Of this 2,929 miles was owned and 353 leased; the rest was made up by trackage rights.

In that year the gross earnings were \$20,668,000, the net earnings from operation \$6,992,000 and the net income was \$7,702,000. From this the interest payment amounted to \$3,085,000; the dividend at four per cent. was \$1,960,000, and the surplus for the year was \$1,813,000 after paying certain rentals. Comparing the two years, 1899 and 1898, the results were:

	1899.	1898.
Gross Earnings.....	\$20,668,000	\$19,548,583.59
Passenger.....	\$5,053,581.43	\$4,316,817.13
Freight.....	14,351,655.97	13,835,995.09
Mail.....	596,086.13	567,225.72
Express.....	409,200.00	409,200.00
Rents.....	249,969.85	412,274.37
Telegraph.....	7,471.44	7,071.23
Total.....	\$20,667,914.82	\$19,548,583.59
Expenditures.....		
Operating expenses.....	\$12,762,707.65	\$11,741,403.10
Taxes.....	913,402.94	854,562.85
Net earnings.....	\$6,991,804.23	\$6,952,617.64
Percentage of expenses to earnings.....	61.7%	60.4%
Same, including taxes.....	66.1%	64.1%

The passenger earnings increased 17.07 per cent., while the passenger miles increased 21.35 per cent. The freight earnings increased 3.73 per cent. The rate per ton per mile increased from 0.97 to 0.99 cents. The ton miles increased 2.2 per cent., and aggregated in the year reported on \$1,452,386,498.

The charges to construction and equipment account for the year included nearly 300,000 for land and land damaged, \$265,000 for additional second track, \$367,000 for track elevation in Chicago and \$318,000 for the Chickasha Branch. The charges to operating expenses included \$225,000 spent in replacing pile, trestle and wooden bridges or filling in with earth. Nearly 1,300 freight cars of various classes were bought or built during the year, and these also were charged to operating expenses, as were 16 large locomotives.

The increase in gross was \$1,119,331, and it is noteworthy as indicating the growing diversity of traffic on the lines west of the Missouri River that the gains following large increases in 1898, were obtained despite a serious reduction in the grain traffic, particularly in corn, which is especially important to the Rock Island and the Chicago, Burlington & Quincy. In 1898 it formed nearly 10 per cent. of the total traffic of the former, and the loss in tonnage was about 17 per cent. An excellent wheat crop in Kansas partially made up this loss, but taking all grains there was an important decrease in this traffic. It was more than made up by a larger movement in merchandise, coal, lumber and other general traffic, resulting from the more prosperous condition of the West, so that the tonnage of all freight is over five per cent. above last year's high record. The figures of a year ago showed a gain in gross of \$2,401,900 and in net of \$1,418,800, but even with the further gain of over a million this year the gross is not up to the figures of 1894. In net the best previous figures are exceeded in both of the two latest years.

The decrease in first charges of \$181,394 is due to the refunding of bonds carried out during the year. Although the dividends charged against earnings during the year amount to but four per cent., the company actually distributed 4% per cent. and is now paying 1 1/4 per cent. quarterly. The extra one-fourth per cent., it appears, came out of the improvement and addition account, which has been carried in the capital accounts at something over \$8,000,000. It is now explained as having represented that amount of net earnings spent between 1880 and 1885 for construction work, and now distributed to the stockholders, carrying out a pledge made at the time. The 10 per cent. stock dividend, authorized at the last annual meeting was charged against this fund and the balance needed to complete the distribution will be paid in the form of extra quarterly dividends of \$125,000 up to 1903. During the year the improvement account has thus been reduced \$4,990,308 and now stands at \$3,222,692.

The only other changes in the capital account besides those resulting from the bond refunding are the addition of \$1,499,873 for construction work. Some of the chief traffic statistics follow:

	1899.	1898.	Inc. or dec.
Freight revenue.....	\$14,351,656	\$13,835,995	I. 515,661
Freight tons.....	8,193,409	7,755,715	I. 437,694
Freight ton mileage.....	1,452,386	1,421,433	I. 30,953
Ton mile rate.....	c.99	c.97	I. c.2
Av. frt. haul (miles).....	195	200	D. 5
Freight train miles.....	8,365,560	8,387,650	D. 22,090
Frt. train m. earn.....	\$1.72	\$1.65	I. \$.07
Pass. revenue.....	\$5,053,581	\$4,316,817	I. \$736,764
No. pass. carried.....	5,678,621	4,925,034	I. 753,587
Pass. one mile.....	240,826,469	196,837,843	I. 43,988,626
Pass. mile rate.....	c2.034	c2.102	D. c.068

\*000 omitted.

#### Locomotive Sparks.

It will be remembered that in a paper before the New York Railroad Club, in September, 1896, Prof. Goss called attention to the fuel lost from locomotives in the form of sparks. The results of determinations on the Purdue testing plant, reported at that time, showed wide variations in the range of spark losses, depending upon the conditions of running. For instance, with the locomotive running at light power and with a vacuum in the smoke box of 3.07 in. of water, the total loss amounted to 7 per cent. of the fuel value of the coal fired. Whereas, when the draft was increased to 7 in. of water the fuel lost by sparks was found to nearly equal 25 per cent. of the dry coal fired.

The results of these tests were principally of in-

terest to motive power men as showing the amount of unburned fuel that might pass as sparks through the tubes of the boiler. Yet the loss to railroads by locomotive sparks is not alone the value of the fuel represented, but damage claims for fires started by locomotives are common.

In a recent number of the Purdue University "Exponent" it is stated that a prominent western road, running through a dry district, reports an annual loss from such fires averaging about two thousand dollars per mile, while individual claims range from one to fifty thousand dollars.

Further, this article describes an investigation carried out at Purdue to disclose some facts as to the chances of fire arising from this cause; this work involved field observations along the right-of-way of a neighboring railroad and was intended to supplement the experiments on the testing plant previously referred to.

The investigation, it is stated, was based upon the supposition that if sparks from a passing locomotive could be caught just before striking the ground, the distance they would fly could be determined with considerable accuracy. To accomplish this square pans were placed at distances of 15, 25, 50, 75, 125, 175, 275 and 375 ft. from the center of the track. In each pan was laid a wooden frame covered with soft cotton cloth. The object of this was to secure a record, where possible, which would give some indication of the temperature of the spark. If, for example, the spark were large enough and hot enough to scorch the cloth, the fact would be made manifest. A location was chosen near the top of a heavy grade over which many freight trains passed daily, and across which the wind had an unobstructed course. The observations included direction and velocity of the wind, the velocity of the train, the condition of the weather and the temperature of the air.

The largest quantity of sparks fell in the pans 50 and 75 ft. from the center of the track. The largest cinder caught did not equal in size a common white bean. In no case was the cloth in the pans scorched, showing that if the cinders entrapped were alive when they left the locomotive, they had lost their heat before reaching the pan. Fine dust-like particles were found to fly distances as great as 375 ft., but this was only true under the influence of a very strong side wind.

The article notes that in this connection the probability of a fire arising from sparks is bounded by many qualifying conditions. Atmospheric temperature, weather condition and the material along the track are all important factors, since they effect the rapidity with which the individual spark will cool after leaving the stack and the ease with which it may communicate heat to the material upon which it lodges.

The conclusion drawn from these observations should be of especial interest to the claim department. It is stated that the chance of a fire starting at any considerable distance from the track can never be great and except the atmospheric and weather conditions are most favorable, it would seem impossible for sparks to ignite material which is very far removed from the right-of-way. While it is admitted that fires do occur which are started on or near the right-of-way, and while it sometimes happens that fires thus started cause other fires more remote from the track, it is perhaps not too much to say that many claims are paid by railroads in satisfaction of losses for which they are not responsible.

The work of changing the motive power to electricity on the Manhattan Elevated Railroad, New York, is now actually under way. The preliminary plans are being brought together and completed under the direction of Mr. W. E. Baker, the newly appointed Electrical Engineer of the road, who has just moved the engineering force to 32 Park Place, occupying the entire second floor. It was generally understood when Mr. Baker came from the Metropolitan Elevated, Chicago, that work would soon be begun in earnest, and the progress of the work confirms this notion. No one company will receive the contracts for the work; and, as yet, it is undecided to whom contracts for the electrical apparatus will be given. Some material—other than electrical—has already been bought, and more will be contracted for as the plans are perfected. These facts, which have been received from an officer of the Manhattan company, makes it reasonably certain that there will be no more indefinite postponements of this important work. An undertaking involving the expenditure of possibly \$18,000,000 cannot be planned in a day or carried out in a week, and any apparent delay in pushing the work will not be for want of energy in the engineering departments under Mr. Baker.

The remarkable President of the Board of Health of the City of New York says that he has tried in vain to get the grand jury to indict the Manhattan Railway. He has sent to the grand jury report after report from the inspectors of his department as to the insecurity of the elevated structure, and has sent to them also hundreds of photographs, "but they refuse to consider them in a sufficiently serious light." Mr. Murphy is one of the most accomplished humorists now above the horizon. He actually makes people think that he thinks that the so-called reports which he has made public concerning the condition of the structure of the elevated railroad are serious. Nobody but a born comedian could go before the grand jury with those reports in his hands and keep a solemn face. Mr. Murphy has gifts for low comedy which ought to make his fortune.



### Railroad Legislation in Massachusetts.

The Legislature of Massachusetts was in session this year from Jan. 4 to June 3, and the railroad committee had 28 matters before it, most of which, however, were of only local interest. There was a renewal of last year's attempt to compel railroads to carry bicycles in baggage cars free, and the House passed such a bill, but the Senate killed it.

A special law was passed to provide for abolition of grade crossings in East Boston. The usual distribution of the expense between the State, the City and the railroad is set aside, and the city is required to pay 20 per cent., the State 30 and the railroads 50 per cent. The two interested in this improvement are the Boston & Maine and the Boston & Albany. A large number of streets are involved.

There was a determined effort to reduce fares in the suburban district around Boston, but the Legislature sustained the railroad commissioners, who, in their annual report, declined to disturb present rates. A bill to compel all railroads to put gates on the platforms of passenger cars was also defeated.

There was a long contest over a bill to have street car tracks laid in Tremont street, Boston, where, only a few months ago, the tracks which had been there for many years were taken up in consequence of the construction of the subway beneath the street. Some of the tradesmen who lost business by the diversion of the street car traffic to the underground line started a movement for the restoration of the surface tracks; and, after weeks of discussion, a bill was passed, but with the proviso that the law must first be approved by the citizens of Boston at a general election.

The Street Railway Mutual Insurance Co. was incorporated. This concern can begin business when six Massachusetts street railways desire to join it.

The Legislature rejected a bill permitting all street railways to act as common carriers of freight, coal and supplies for street railway purposes, but passed several special bills to permit certain roads to do this. The proposition of certain citizens of Brockton to incorporate the "Massachusetts Electric Freight Railway Company," with the right to run cars over the various lines between that city and Boston was frowned upon by the street railway committee, and rejected.

A bill was passed to punish the injury or destruction of street railway signals, by the same penalties as now apply to railroad signals. The law empowering the railroad commissioners to cause to be made regular examinations of steam railroad bridges was extended to apply to bridges used by street railroads.

### Electrolytic Corrosion of Water and Gas Pipes.

One of the unforeseen results following the electric railroad has been the electrolytic action on underground pipes caused by the return current. Various methods have been suggested for doing away with this evil on the single-wire electric roads, and the more common and successful method is in the perfect bonding of the track and the proper placing of ground-return feeders. If care be taken to carry out these simple remedies, electrolytic action can be reduced in most cases to an inappreciable quantity. That these precautions will not always answer is well known; and while the more serious effects are lessened, unless the action is entirely done away with, difficulties and troubles are sure to arise in years to come which may be of a very serious nature.

This subject has been somewhat thoroughly and systematically investigated at the University of Wisconsin for the past six years. The results of some excellent work in this direction, which has been done under the direction of Prof. D. C. Jackson, head of the Department of Electrical Engineering at that University, have been brought out in the theses of some of the students and these have been printed in some of the electrical papers from time to time.

Their work in 1893-4 showed that electrolytic action of railroad currents upon buried metal is particularly insidious and dangerous because the amount of metal carried away every hour for every square foot of pipe or other metal structure, which is electrically positive toward the surrounding earth is directly proportional to the current which leaves the area, regardless of the small amount of electrical pressure which causes the current to flow. The work showed that the iron of the structure acted upon was carried off into the earth by the electrical action and was there deposited by secondary chemical reactions in the form of hydroxide and probably other insoluble salts of iron. This deposit was shown to sometimes occur at considerable distances from the anode from which the iron was removed, but it never reached the cathode. It was found that a cast-iron anode was left in a soft or spongy condition.

Prof. Jackson says in an article on this subject in the May issue of the Wisconsin Engineer, that the results of these early experiments and observations are in full harmony with what is now known from later investigations, and that all the actions manifested in underground pipe might have been predicted when the electric railroad was begun, had the theory been properly reasoned out and applied. In

spite of all that has been said and learned in regard to the dangers of electrolytic action, many engineers of experience and some of good training still ignore the facts or do not understand them.

A suggestive, but possibly an extreme illustration, is cited by Prof. Jackson of an investigation made in Milwaukee. A cast-iron water pipe of considerable diameter became leaky and was uncovered. Upon investigation it was found that a considerable length of pipe, together with a cast-iron valve case attached in its length, had been so far acted upon that holes could be whittled at any point through their substance by means of a common jack knife; yet the pipe and valve case had preserved their shape, and a superficial examination showed no immediately apparent evidence that the material had been robbed of its strength. Much of the iron had actually been transferred to the surrounding earth by the insidious activity of the electric current, and the graphite, silicon, manganese and other alloying elements of the cast-iron, which have little strength, had remained behind to preserve the fair semblance of the structure, the strength and value of which had in reality been destroyed.

Among the various remedies proposed, and in a few cases acted upon, is to have the pipe system a continuous electrical conductor, and connected at sufficient intervals to properly built railroad return connections. That this is impracticable in most cases where the pipes have been laid is self evident. The use of alternating currents has been suggested as a remedy, but laboratory experiments at the University of Wisconsin show that corrosion by alternating currents occurs at both electrodes when the chemical products of electrolysis are insoluble in the solution. Referring to this point, Prof. Jackson states that "most of the iron salts that are likely to be formed by the direct action of the electrolysis, when the solution is soil water, are soluble in the solution, but the reverse is true of lead salts. It is therefore clear that the use of alternating currents would probably prove to be a disappointing remedy for electrolytic action."

This subject is worthy of more experimental study and might form the basis of some interesting researches. Among the 27 subjects at the last meeting of the American Institute of Electrical Engineers which were mentioned as being submitted to electrical laboratories in universities and colleges for investigation, this subject was not included. If topics can be added to this list, it might not be out of place to suggest that the subject of electrolysis by alternating currents be considered. In this connection it might also be noted that the subject of the relative electrical resistance of the several rail bonds has never been investigated fully and would doubtless form a subject of a very instructive series of tests.

A partial remedy for this evil is the "double trolley." The successful working of the conduit electric roads in New York and Washington on this system and the double trolley overhead construction in Cincinnati, O., prove the practicability of these methods of working. Were it not for the expense of the conduit electric road we should hope to see legislation in many cities requiring its adoption in place of the overhead wire. In Cincinnati the conditions are such as to make the working of the road especially trying for any system. In that city there are over 13 miles (double track) of grades of more than five per cent., some long grades being six or seven per cent. and for shorter distances 10 and 12 per cent. The cars in Cincinnati have two 50 h. p. motors each. Notwithstanding the very heavy and long grades to be overcome and the working of three inclined planes where the cars are lifted on a platform up the hills, it is possible for a passenger in Cincinnati to ride from 15 to 16 miles over several different routes for five cents, and the average net receipts over operating expenses is about 1.36 cents per passenger carried. These few particulars are briefly noted in order to indicate the difficulties in Cincinnati. The road there works successfully.

The serious difficulties of electrolytic action, however, come from those systems where extensive electric railroads and the water and gas pipe mains are already in place. Neither can be abolished, and the remedy must therefore soon be generally applied which will relieve the water supply from attack by railroad currents. The cure, however, is found not in any one suggestion or method, but rather in continuing all possible preventatives against stray currents and providing perfect returns, some of which have been referred to above, and by insisting on more careful and rigid inspection on the part of both city and the company. What action should be taken to accomplish the desired results is another question which we will not attempt to answer.

### Exhibits at the Mechanical Conventions.

(Continued from page 431.)

Dayton Malleable Iron Co., Dayton, O.—Dayton car door fastener, draft rigging and malleable specialties.

Detroit Graphite Mfg. Co., Detroit, Mich.—Samples of graphite paint.

Detroit Lubricator Co., Detroit, Mich.—Detroit lubricator with improved Tippet attachments; new Detroit lubricator with valves in steam chest to overcome back pressure and continuous feed.

Diamond Rubber Co., Akron, O.—Full line of rubber railroad supplies; the Diamond diaphragm bicycle tire and a five-inch flat thread motor tire.

O. M. Edwards, Syracuse, N. Y.—Working model of the Edwards self-raising car window.

J. A. Ellis, Detroit, Mich.—Detroit coupler; Thornburgh attachments and Welch spring uncoupling connections.

Fairbanks, Morse & Co., Chicago, Ill.—Velocipede hand cars Nos. 1 and 16, gasoline motor car, two-seated bicycle hand cars, track gages and levels, track jacks, cattle guards, 12 H. P. gasoline air compressor.

Gold Car Heating Co., New York and Chicago.—This was one of the largest of the exhibits. The Gold system of steam heat for railroad cars was shown, under pressure, on a long raised platform. The piping used represented a complete train.

Goodwin Car Co., New York City.—The methods of dumping stone and gravel was shown on the government track back of the Hygeia Hotel with five full-size Goodwin cars, exhibitions being given twice each day. The company had also a working model of the Goodwin car, which was on exhibition in the palm garden of the Chamberlin, and a number of drawings and photographs, some of which were thrown on a screen by a magic lantern.

Greenlee Bros. & Co., Chicago, Ill.—Samples of wood-working machinery supplies.

Gumbo Cement Co., Chicago, Ill.—Samples of cement.

Hancock Inspirator Co., Boston, Mass.—Three composite injectors, in sections, to show working; also main steam valves and boiler checks.

Heywood Bros. & Wakefield Co., Boston, Mass.—Six full-size car seats upholstered in plush and rattan. The company also showed its seats in connection with the exhibit of the Boston Artificial Leather Co.

C. B. Hutchins & Sons, Detroit, Mich.—Model Metal Car Roof.

Jenkins Bros., New York City.—Globe, angle, pump and swing check valves; Sellers' restarting injector and Jenkins discs and Standard '96 packing.

H. W. Johns Mfg. Co., New York City.—A full line of vulcanized goods for railroad purposes, including insulation; paints; roofing and fire-proof construction materials; fire felt locomotive lagging; steam pipe and boiler coverings; steam packings and fireproof cements and coatings.

Jones Car Door Co., Chicago, Ill.—Full size model of the Jones freight car door.

The M. E. Kanaly Co., Cambridgeport, Mass.—Full size model of a freight car door, showing application of the Kanaly door hanger and seal lock.

Keasbey & Mattison Co., Ambler, Pa.—Samples of sectional magnesia lagging for locomotive boilers.

Knitted Mattress Co., Canton Junction, Mass.—Full line of samples of knitted padding as a substitute for curled hair for upholstering car and locomotive cab seats.

Henry L. Leach, North Cambridge, Mass.—Full size model of the Leach pneumatic sanding device for locomotives.

Leach & Simpson, Chicago, Ill.—Samples of Corning brake shoes and U. S. Bronze Co.'s car and locomotive brasses.

A. Major, New York City.—The Major patent ice receptacle for water coolers.

Manning, Maxwell & Moore, New York City.—Full size sectional models of the Metropolitan injector, Ashcroft steam gage and Consolidated safety valve.

McConway & Torley Co., Pittsburgh, Pa.—Two cars equipped with Buhoup three-stem freight car couplers.

McCord & Co., Chicago, Ill.—Ten full size McCord malleable iron journal boxes and lids as applied to cars of the Pittsburgh & Lake Erie, Lake Shore & Michigan Southern and other large railroads. A full size model of the Johnson hopper bottom for coal cars was also shown.

Michigan Lubricator Co., Detroit, Mich.—Two No. 3 and one No. 2 improved Michigan triple locomotive lubricators with automatic steam chest plugs and three air pump cups.

Missouri Railway Equipment Co., St. Louis, Mo.—Draft attachments, car doors and roofs, trucks and castings, side bearings and sill and carline pockets of malleable iron.

Monarch Brake Beam Co., Detroit, Mich.—Eight full size Monarch and Solid brake beams. One of the Solid beams shown was tested by the Cleveland, Cincinnati, Chicago & St. Louis R.R. August 15, 1898, by applying pressure up to 18,000 lbs., leaving no permanent set.

Moran Flexible Steam Joint Co., Louisville, Ky.—Samples of Moran flexible steam joints.

National Car Coupler Co., Chicago, Ill.—Full size passenger coupler, platform buffer, set of Hinson drawbar attachments and model of passenger car coupler.

M. & S. Oiler Co., Denver Col.—McVicar oilers.

National Malleable Castings Co., Cleveland, O.—Tower couplers.

National Railway Specialty Co., Chicago, Ill.—Full size model of the Security car door and samples of N. R. S. journal bearing keys.

New York Belting & Packing Co., New York, N. Y.—A full line of air brake hose, showing regular standards and samples made to special railroad specifications; car heating hose, of which the company furnished during the past season to various railroads over 70,000 ft without an instance of unsatisfactory service; R. R. S. engine and tender hose; pneumatic tool, fire, water and gas hose; vacuum brake diaphragms and interlocking rubber tiling for dining cars, car platforms and passage ways, stations and offices. An interesting feature of the exhibit was a series of pictures and samples showing rubber from its origin in the tree and the various forms in which it is received in this country from the tropics, to the finished goods.

A. O. Norton, Boston, Mass.—Ball bearing jacks.

Ornamite Veneer Co., New York City.—Headlinings and wainscoting for passenger cars and for depot and office interior decorations.

Oval Brake Beam Co., Philadelphia, Pa.—Samples of brake beams.

Pantasote Company, New York City.—Section of a parlor car furnished with headlinings and curtains of Pantasote and seats upholstered with Pantasote. A large number of samples of Pantasote materials was also shown.

Pearson Jack Co., Boston, Mass.—Five full size Pearson ratchet jacks for steam railroad car service.

Peerless Rubber Mfg. Co., 16 Warren street, New York.—A well-displayed exhibit of rubber goods, including the famous "Rainbow" sheet packing, "Anaconda" corrugated engine and tender hose, air brake, gas, steam and fire hose, spiral piston packing for Westinghouse air pumps, "Eclipse" sectional gaskets and the various styles of molded gaskets used by the Westinghouse Air-brake Co., car step threads, hard rubber valve discs, gage glass rings, pump valves and rubber mating and belting. Several Peerless hose nipples were also shown.

Pressed Steel Car Co., Pittsburgh, Pa.—The exhibit of this company consists of seven steel cars, including one Laughlin & Co. car of 100,000 lbs. capacity; one Baltimore & Ohio and one Pennsylvania hopper bottom coal car of 100,000 lbs. capacity; one Union Pacific gondola car of 90,000 lbs. capacity; one Pittsburgh, Bessemer & Lake Erie gondola car of 95,000 lbs. capacity and one Lake Shore & Michigan Southern gondola car of 100,000 lbs. capacity.



Q. & C. Co., Chicago, Ill.—Pneumatic tools for chipping, caulking, beading and riveting; Dunham car door and Wood car seal.

Railroad Supply Co., Chicago.—Hien coupler for freight and passenger cars and locomotive tenders, also a patent journal box lifter.

The Railway Appliance Co., Chicago, Ill.—Emergency knuckles, car brasses and other supplies for railroads.

Rand Drill Co., New York City.—A Rand Straight Line steam driven compressor, used to supply air to the exhibits of the Standard Pneumatic Tool Co., R. Bliss Mfg. Co., Henry L. Leach and Western Railway Equipment Co.

Wm. Sellers & Co., Incorp., Philadelphia, Pa.—A full size Sellers' improved '87 automatic restarting locomotive injector fitted up to show method of working.

Shelby Steel Tube Co., Cleveland, O.—Samples of cold drawn seamless tubing for boiler tubes and other mechanical purposes, made from mild open-hearth steel.

The Sherwin Williams Paint Co., Cleveland, O.—Samples of colors on boards.

Simplex Railway Appliance Co., Chicago, Ill.—Full size body and truck bolsters for 80,000 and 80,000 lb. capacity cars and short bolsters for swing motion truck.

Smillie Coupler & Mfg. Co., Newark, N. J.—Full size model of the Smillie Improved M. C. B. coupler.

Standard Coupler Co., New York, N. Y.—The Standard steel platform and passenger and freight couplers were shown on a large raised platform.

Standard Pneumatic Tool Co., Chicago, Ill.—Pneumatic drills, riveters and hammers for chipping, caulking and beading; pneumatic reversible boring machines, reversible flue rolling and reaming and tapping machines; also pneumatic chain hobs.

Star Brass Co., Boston, Mass.—Locomotive, air and steam gages; chime whistles and pop valves.

Sterlingworth Railway Supply Co., Easton, Pa.—Full size models of the Sterlingworth truck and brake beams.

B. E. Tilden Co., Chicago, Ill.—Wrecking frogs.

United States Railway Supply Co., New York City.—Pottier & Stymus Glidover and Reversible car seats, upholstered in frieze plush, Pegamoid and rattan, and seats for parlor cars; also a newly patented sofa for private cars, which can be converted into a bed. A full line of samples of Pegamoid, a substitute for leather for car curtains and seats, was also exhibited.

Universal Car Bearing Co., Chicago, Ill.—Universal car brasses and models of the Universal car door.

Washburn Coupler Co., Minneapolis, Minn.—Flexible head passenger car coupler with adjustable draft stem and draft box; straight stem passenger coupler with auxiliary hook; socket coupler for pilot use; socket coupler with buffer attachment for passenger car use; socket coupler castings fitted with Miller hook and buffer for passenger service; safety coupler and casting complete, pilot box coupler; Standard freight coupler, and Grand Truck tender coupler.

Western Railway Equipment Co., St. Louis, Mo.—Combination lug and follower casting; Economy slack adjuster; tandem combination lug and follower; Turner draft rigging; Western flush car door; Western sill pockets; Downing cord holder for freight cars; Union car door and Houston pneumatic sanding device for locomotives.

#### TECHNICAL.

##### Manufacturing and Business.

The Guyaquil & Quito Railroad Co., Box 37, Guayaquil, Ecuador, South America, would be glad to receive catalogues from concerns making anything which is used in building, maintaining or operating a railroad.

The Railway Cycle Mfg. Co., Hagerstown, Ind., on May 18 last shipped 27 Hartley & Teeter light inspection cars to Hamburg, Germany, to be used by the State railroads of that country. This company reports that its business for May was larger than that for any previous month, and that its shops are working extra time.

The patents of Mr. E. Grafstrom, Chief Draughtsman of the Pennsylvania Lines west of Pittsburgh, Southwest System, on draft rigging devices have been bought by the Dayton Malleable Iron Co., which company expects soon to put the devices on the market.

The Standard Scale & Supply Co., of Pittsburgh, is making additions to its plant at Bellefonte, Pa.

At a meeting of the stockholders of the Rome Locomotive & Machine Works, held June 7, the following Directors were elected: W. B. Isham, Ralph M. Ellis, H. A. V. Post, T. H. Stryker and Edward Comstock.

The Hagerstown & Frederick Railroad Co. will require some 58-lb. T-rails and 80-lb. girder rails.

The following officers of the Western Car Co. have been elected: President, Anthony J. Thomas; Vice-President, B. Perkins; Treasurer, J. P. Curtis. The Directors are: E. L. Hinman, James L. De Vou, L. Holbrook, Frank E. Wing and C. P. Dieffendorf.

The co-partnership heretofore existing between F. C. Wheeler and W. S. Boody, trading and doing business as the Wheeler & Boody Company, has been dissolved by mutual consent. The business interests have been acquired by the Consolidated Public Works Company, which for the present will conduct its affairs from the office formerly occupied by Wheeler & Boody Company.

##### Iron and Steel.

The production in May at the works of the Pennsylvania Steel Co., at Steelton, Pa., was the largest in the history of the company.

The pay roll of the Cambria Steel Co., Johnstown, Pa., June 3, amounted to \$191,300. This is the largest amount ever paid out. The company now has over 8,200 men on its pay rolls.

The Penn Steel Casting & Machine Co. has bought a plot of ground in Chester on which to make additions to its plant.

The Iroquois Iron Co., which some time ago bought the plant of the Iroquois Furnace Co., at South Chicago, as noted in this column at the time, has now bought a tract of land 1,200 ft. by 1,400 ft., extending from Ninety-sixth St. south to the tracks of the Lake Shore & Michigan Southern.

The company will at once build a new blast furnace and docks on the Calumet River, the extension to cost about \$500,000. The capacity of the new furnace will be about 100,000 tons of metal a year, or a total output of 180,000 tons for the new and old furnaces together. Additional docks fronting 700 ft. on the river will be built, making a total frontage of about 1,100 ft.

##### Axle Lighting.

The National Electric Car Lighting Co. has just equipped with "axle light" President Callaway's private car "Genesta," of the New York Central & Hudson River Railroad Company. They have also just received an order to equip Dr. Webb's private car "Viceroy," of the Wagner Palace Car Company.

##### A Car Wheel Company.

The Ramapo Car Wheel company was incorporated at Albany, N. Y., June 12, 1899, for the manufacture of wheels, cars and general railroad supplies of steel, iron, brass, etc. Capital \$100,000, \$30,000 preferred and \$70,000 common, in shares of \$100. Directors, first year: J. Fred Pierson, Ramapo, N. Y.; A. E. Piorkowski, H. L. Satterlee, David H. Taylor, Benj. A. Mason, New York City.

##### Pneumatic Interlocking.

The Standard Railroad Signal Co., of New York City and Troy, has received an order from the Chicago Terminal Transfer Co. for a pneumatic interlocking plant, to be put in at the passenger terminal of the company at the "Grand Central" Station at Chicago. The Chicago Terminal Transfer is the successor of the Chicago & Northern Pacific, and its station is the terminal used by the Wisconsin Central, the Chicago Great Western and the Baltimore & Ohio. The new machine will have about 68 working levers, which will operate 76 switches, two movable point frogs and 49 signals. This apparatus will take the place of two pneumatic plants now in use, one electro-pneumatic and the other hydro-pneumatic.

The New York office of the Standard Railroad Signal Co. is now at 36 Wall street.

##### Car Curtains.

The Curtain Supply Company has recently been incorporated under the laws of New Jersey and has bought all the patent rights relating to curtains and curtain fixtures, and the entire curtain business of the following makers: The Adams & Westlake Company, Chicago; Forsyth Bros. Company, Chicago; and the E. T. Burrows Company, Portland, Me. These three companies now make about 90 per cent. of the curtains and fixtures used in steam and street cars, and in steamships. The headquarters will be in Chicago, where a plant is now being equipped. The officers will be as follows: President, E. T. Burrows; Vice-President and Treasurer, Ward W. Willits; Secretary and General Manager, W. H. Forsyth. During the past three years there has been almost continual litigation between these three companies in regard to patents. This has had the important result that most of the patents held by the new company have been adjudicated both by the United States Courts and Patent Office, and one of the principal reasons for selling out to the new concern was to avoid further expense of patent suits. All suits for infringement now pending have been settled, so that railroads and others are cleared of liability for using infringed goods bought of any of these three companies. The new company owns over 50 patents on curtains and fixtures and can guarantee immunity from claims for infringement.

##### A Double Spindle Boring Machine.

Among the new tools exhibited by the Standard Pneumatic Tool Co., at the Old Point Comfort Conventions, was a double spindle boring machine which is shown by the accompanying engraving. This is of the piston type, and similar to the regular No. 6 boring machine, excepting that there are two spindles. One spindle is geared so as to run at high speed for small boring, while the other has back gears, runs slowly and is intended for boring large holes. This tool weighs 14 lbs., and when running requires 25 cu. ft. of free air per minute. Like the single spindle motor, it can be reversed while running.

##### A 54-Mile Flume for Oregon.

The Detroit Flume & Transportation Co. was recently incorporated in Oregon by the Detroit Lumbering Co. The capital stock is \$60,000; \$30,000 will be expended in putting in a flume from Detroit on the Santiam to Salem, both in Marion County. The flume along the river will cost \$2,000 a mile. The main ditch will be about 54 miles long.

##### THE SCRAP HEAP.

##### Notes.

The New York State Railroad Commission, after examining crossings on the Long Island road, has authorized seven crossings to be closed, three of them in Hempstead and one each in four other towns. In the cases of 14 other crossings, petitions for discontinuance were denied.

The Supreme Court of Texas, in the case of Davis vs. San Antonio & Gulf Shore, has decided that the powers of the State Railroad Commission with reference to registration and approval of railroad stock are only ministerial; the Commission has no power to declare any stock either valid or invalid.

The Montreal Street Railway Co. has notified its employees that the company will insure each man for \$1,000 against accident or total disablement; that conductors and motormen who have been in the service two years will have their wages raised, and that those who have served five years will have their uniforms furnished free by the company.

Business at the Lake freight houses of the railroads in Buffalo was again stopped on Monday of this week by a strike of the laborers. Subsequent reports seem to indicate that new men will probably be secured to take the places of the strikers.

The contract has just been let for a new building for the Young Men's Christian Association in the yards of the Grand Trunk Railway at Detroit.

At Pittsburgh, Pa., on Monday last, a ticket broker was convicted under the Pennsylvania law forbidding unauthorized agents to deal in tickets.

The Boston & Maine is sprinkling with oil its roadbed in the district around Boston; and, according to published reports, will at once sprinkle about 160 miles of line. Two sprinkling cars are in use. The New York Central is going to oil ten miles of its road near Poughkeepsie.

According to New York and Chicago papers many freight brakemen have lately been bewailing the fate which has befallen them since the introduction of large locomotives, and the use (on roads which cannot afford new engines) of two ordinary engines on a single train, thus reducing the number of trains and consequently the day's work they can put in each month. This is, indeed, a cause for the blues, but these men should thank their stars that they are still better off than some of their brethren. A California paper reports that on the Southern California the eastbound freight trains out of San Bernardino are now being made so long that three engines are needed to haul them. On a certain night recently three trains started out with three engines each and a fourth train had four engines. The four trains had only six brakemen.

The passenger trains of the Plymouth Branch of the Philadelphia & Reading, which were recently taken off on account of the extreme lightness of the traffic, have been restored, a number of residents along the line having protested against the entire abolition of passenger trains. It was shown that the charter under which this line was built required passenger trains to be regularly run.

The Southern Pacific Co. has lately completed a handsome and finely equipped employees' hospital on Mission Street, San Francisco. The San Francisco Chronicle of June 4 publishes a description of the internal arrangements and appliances, which are of the latest and best designs; and the article is accompanied by direct process engravings of the building, which is of brick, three stories high, with two large wings. The employees of the road provide the main support for this and the other hospitals on the line by contributions of 50 cents each, monthly. Mr. C. P. Huntington has provided a library for the new hospital. The chief surgeon is Dr. M. Gardner.

##### A Long Freight Run.

A new locomotive of the Big Four, weighing about 93 tons, has been run through from Newport News, Va., to Kankakee, Ill., about 900 miles, over the Chesapeake & Ohio and the Cleveland, Cincinnati, Chicago & St. Louis, drawing a train of 72 cars carrying 1,700 tons of freight.

##### Main Items of Commerce Through the Canals at Sault Ste. Marie, May, 1899.

		East Bound.			
		U. S. Canals.	Canadian Canals.	Total.	
Grain	.....Bushels.	8,034,302	301,590	8,335,892	
Flour	.....Barrels.	893,520	89,718	983,238	
Iron Ore	.....Net tons.	1,464,875	154,519	1,619,394	
Wheat	.....Bushels.	6,353,673	2,089,715	8,443,388	
		West Bound.			
		U. S. Canals.	Canadian Canals.	Total.	
Coal (hard)	.....Net tons.	104,659	24,130	128,789	
Coal (soft)	.....Net tons.	272,476	44,725	317,201	
Manufactured iron	.....Net tons.	17,043		17,043	
Salt	.....Barrels.	67,178	8,287	75,465	
Unclassed freight	.....Net tons.	56,476	11,362	67,838	
East bound freight, net tons				2,365,906	
West bound freight, net tons				542,262	
Total, freight, net tons				2,908,068	

##### Electricity on the Chicago, Milwaukee & St. Paul.

The Chicago, Milwaukee & St. Paul is again working on the plan to convert its Evanston Branch into an electric line between Llewellyn Park and Kinzie St., Chicago. A letter signed by President Roswell Miller has been published which says that the road proposes to run single cars at 5 minute intervals, making only station stops, and also proposing to reach the Northwestern Elevated by an incline, and "it is expected that the Northwestern Elevated will haul the cars from the Chicago, Milwaukee & St. Paul over its road and around the Loop as soon as business demands it." The company is now getting signatures to a petition for an ordinance to permit electric operation.

##### Drainage Canal Water Power.

Preliminary negotiations are under way at Chicago between the Directors of the Diamond Match Co. and the Trustees of the Drainage Canal for leasing the water power which can be developed in the canal at Lockport and Joliet.



**A Proposed Railroad in Peru.**

Concessions have been asked by men representing two different interests for an extension of the Central Ry. of Peru from Oroya to Cerro de Pasco, and the Government has asked for bids to secure the most favorable terms for building. This extension is 80 miles long, most of which will be comparatively light in work. There will only be about 10 miles of heavy work in the vicinity of Oroya and Cerro de Pasco. About 1,000 tons of copper ore per month are shipped at the present time from the Cerro de Pasco region, and as only those ores of 33 per cent. copper can bear the present mode of transportation it is probable that the new railroad would largely increase the shipments. This region was formerly famous for its enormous production of silver.

**Lake Notes.**

It is reported that the F. W. Wheeler shipyard at West Bay City, Mich., has been appraised and that it will become a part of the American Shipbuilding Co.

The freight steamer Manila was launched at the yards of the Chicago Shipbuilding Co. on June 7, and when completed will be put in the northern lake service.

Mr. A. B. Wolvin, of Duluth, has recently ordered from the American Shipbuilding Co. four steel steamers 500 ft. long to be built at the Lorain, O., shipyards. These steamers will be the largest yet built on the lakes, being larger than the steamer for the Bessemer fleet, noted in our issue of Feb. 24, p. 144. The new boats will be 500 ft. long over all, 478 ft. keel, 52 ft. beam and 30 ft. deep, and are to be delivered at the opening of navigation in 1900. They will have water tube boilers to carry 250 lbs. of steam, quadruple expansion engines with cylinders 17 in., 25½ in., 39 in. and 60 in. in diameter by 40 in. stroke. There will be 15 hatches and all modern improvements and the boats will have a capacity of 8,000 tons on 18 ft. draft. They will cost \$350,000 each. It is understood that Mr. Wolvin was acting for one of the large steel combinations, and it is reported that the boats are for the American Steel and Wire Co., which bought five steamers last winter.

The steamer Samuel F. B. Morse, of the Bessemer Co., towing a large barge (the two vessels carrying about 13,000 gross tons of ore) recently made an average of 11.2 miles an hour for the entire run from Duluth to Conneaut, with no allowance for checks in rivers or canals. The cargo of 7,023 gross tons of ore carried from Duluth to Conneaut last season by the barge Roebling still holds the record for tonnage moved at one trip.

Reports of ore shipments from Duluth, Superior and Two Harbors from the opening of navigation to June 1 show that 925,782 tons have been shipped, against 805,897 tons to June 1 last year, an increase of 119,885 tons this year. As the first cargo of ore left Duluth May 4 this year, compared with April 21 last year, the increase is considerable in favor of this year. This year the Duluth, Missabe & Northern docks shipped 344,482 tons to June 1, compared with 249,140 tons last year; the Duluth & Iron Range has shipped 495,300 tons, compared with 376,745 tons last year, and small docks show proportionate increases. It is expected that 7,000,000 tons will be shipped from the head of the Lakes this year, and it is reported that 80 cents a ton has already been paid for ore transportation.

**The Grand Central Station.**

The plans for the improvement of the main floor of the Grand Central Station, New York City, have been finally approved and the contractors, Grace & Hyde, who are to do the work, are preparing to begin on July 5; and it is hoped to have the work completed before Christmas, although the changes are very extensive and must be somewhat difficult of accomplishment on account of the unavoidable interference with the current business of the station. The two head houses, the great arch built in 1871 and the annex built in 1885, are to be thrown together as one train house, and the large waiting room, for the use of all the passengers entering the station, is to be in the southern end of the main trainshed, the tracks being shortened to make room. All of the tracks are to be relaid and the train platforms are to be made higher.

**Electric Railroad Notes.**

The Hudson Light & Power Co. has had its charter amended and will hereafter be known as the Hudson Light & Power & Railroad Company. Besides supplying electricity and gas for heat and power it will operate the Hudson Street Ry., which will be operated by electricity. The new corporation has a capital of \$150,000. The Directors are: James Purcell and Morris Hooper, of Valatie; A. M. Young, William F. Sheehan, R. A. C. Smith and H. G. Runkle, of New York.

The Buffalo St. Ry. will spend \$1,000,000 in improvements this year. Almost \$350,000 worth of electrical machinery, it is said, has already been ordered from the General Electric Co. to equip five stations.

The Pasadena & Mt. Lowe Ry. Co. was organized in 1897, and in March of this year succeeded to the Pasadena & Mt. Wilson Ry. The company now owns and operates seven miles of electric railroad from Altadena to Mt. Lowe Springs. It has recently contracted for electric current to be furnished by the Southern California Power Co. The transmission will be from Santa Ana Canyon, where the company has a water plant. The transmission is 90 miles, being the longest in the world. A rotary converter furnished by the General Electric Co. of 300 k.w. capacity is now being installed in the power house of the railroad, and the current will be turned on July 1. Hitherto the railroad company has generated its own current by means of gas engines. The road will be extended to Mt. Lowe, 1,100 ft. above its present upper terminus, requiring either three miles of trolley road or an incline about 1,750 ft. long. This work will probably not begin before the Spring of 1900, as considerable time will be required to determine the character of the work. The officers of the company are: President, Valentine Peyton; General Manager, J. S. Torrance; Secretary and Treasurer, Arthur L. Hawes; Vice-President, Arthur B. Cody.

The New Jersey Electric Ry. was sold under foreclosure last Saturday to satisfy a mortgage of the Mercantile Trust Co. The property was bought by Chandler Ricker for \$1,500,000, and, it is said, will become part of the North Jersey Traction Company's system.

**Technical Schools.**

Washington University, St. Louis.—In our issues of March 24 and April 7 we noted gifts of new buildings and endowments of large amounts to the University, among them being two engineering buildings from Mr. Samuel Cupples. It is now announced that Mr. Cupples has also given \$150,000 toward the endowment of the school of Civil Engineering and Architecture. This increases the amount of Mr. Cupples' gifts to the University within two months to an aggregate of \$400,000.

University of Iowa.—Dr. George E. MacLean, who has been Chancellor of the University of Nebraska since June, 1895, has been elected President of the University of Iowa to succeed President Charles A. Schaeffer, who died in September, 1898. Dr. MacLean was born in Connecticut in 1850 and graduated from Williams College in 1871, taking his Master's degree from Williams College and a degree from Yale University in 1874. In 1881 he went abroad to study and took the degrees of Ph. D. and A. M. In 1884 he was made Professor of Literature at the University of Minnesota, where he remained until 1894, when he again went to Europe. On his return he became Chancellor of the University of Nebraska.

Worcester Polytechnic Institute.—The entrance examinations begin Monday, June 19, at 10.30 a. m. On Tuesday, the day following, a lecture will be given by Mr. John Birkenbine, C. E., of Philadelphia, on "The Great Lakes." The President's reception will be held on June 21 and the graduating exercises June 22, when addresses will be made by Gov. Wolcott and the Hon. John R. Proctor, President of the Civil Service Commission, Washington, D. C.

**LOCOMOTIVE BUILDING.**

The Richmond Locomotive Works are building 15 engines for the Chesapeake & Ohio.

The Pittsburgh Locomotive Works are building one locomotive for the Cleveland Terminal & Valley.

The Dickson Locomotive Works have an order for one engine from the New Jersey Zinc Co., New York City.

The Parral & Durango, now building, has placed an order with the Baldwin Locomotive Works for one engine.

The Rogers Locomotive Company has received an order from the Atlas Cement Co. for two four-wheel tank engines.

The Indiana, Illinois & Iowa has issued specifications and asked bids by July 1 on from four to ten two-cylinder compound 10-wheel locomotives.

The Erie has placed an order with the Baldwin Locomotive Works for 14 Atlantic type engines, duplicates of the order for four recently placed.

The Central Railroad of New Jersey has placed an order with the Brooks Locomotive Works for 10 12-wheel locomotives with 21 x 32 in. cylinders, duplicates of the 15 delivered in April.

In our issue of June 9 we stated that the Great Northern had placed an order with the Rogers Locomotive Company for four switching engines. This was an error, as the order was placed with the Brooks Locomotive Works.

In our issue of May 19 we noted that the Inter-oceanic Railroad of Mexico had placed an order with the Schenectady Locomotive Works for six engines. They are to be delivered: two by August 15, two September 10, and two October 10. They will be simple consolidation engines, 36 in. gage, weighing 91,000 lbs., with 82,000 lbs. on drivers. They will have 16 in. x 20 in. cylinders; the diameter of the drivers will be 38 in.; boilers, straight top, with a working steam pressure of 180 lbs., containing 190 charcoal iron tubes, 14 ft. 6 in. long, with an outside diameter of 2 in.; fireboxes will be 54½ in. long, 44½ in. wide and made of carbon steel. The tank capacity for water will be 3,000 gals., and for coal, five tons. The engines will be equipped with Westinghouse air brakes, Cambria steel axles, Sellers' injectors, Leach double sanding devices, Nathan sight feed lubricators, French springs, Crosby steam gages, Midvale tires on driving wheels, truck wheels and tender wheels, cast iron steel centers, cast steel driving boxes, bronze shoes and axles, Brady metal driving box and rod brasses and Richardson balanced slide valves.

**CAR BUILDING.**

The Texas & Pacific has ordered 100 Rodger ballast cars.

Laughlin & Co. have ordered 25 cars from the Pressed Steel Car Co.

The St. Joseph, South Bend & Southern has ordered 100 cars from the Barney & Smith Car Co.

The Harlan & Hollingsworth Co. is said to have an order for 8 coaches for the Seaboard Air Line.

The Erie Car Works have received an order for 40 cars from the Kushequa, a road which is now being built.

The Houston & Texas Central has ordered six vestibule chair cars 64 ft. long from Pullman's Palace Car Co.

The El Paso & Northeastern is having 35 cars built at the St. Charles works of the American Car & Foundry Co.

The American Car & Foundry Co. is building at its St. Charles works 100 cars for the Mississippi River & Bonne Terre.

It is reported that the Pressed Steel Car Co. has an order for 200 more steel cars for the Egyptian State Rys., in addition to these noted in our issue of June 2.

In our issue of last week we noted that the Houston & Texas Central had ordered 50 box cars. This is incorrect, as the cars are for the Houston, East & West Texas.

We understand that the Illinois Central is about ready to ask bids on the large capacity box cars and probably coal cars which have been under consideration for some time.

At a recent meeting of the California Fruit Grow-

ers' Association at Sacramento, Cal., it was decided to establish a refrigerator car line. About 800 cars will be bought in time for next season's (1900) crops.

The Great Northern has given a sample order for 50 steel cars to the Pressed Steel Car Co. It is understood that these cars will be of 100,000 lbs. capacity, and similar to those built some time ago for the Lake Superior & Ishpeming. This order will probably be followed by a larger order in the early Fall.

The Peoria & Pekin Terminal has ordered from the Illinois Car & Equipment Co. 50 of the coal cars noted in our issue of April 28. These cars will be of 80,000 lbs. capacity and are for July delivery. They will have Westinghouse air brakes, Chicago couplers, Monarch brake beams, Thornburg draft rigging and Universal journal bearings, and will be built on the specifications of the Illinois Central.

**BRIDGE BUILDING.**

ABBOTT, NEB.—Bids are wanted July 1 for a bridge to be built by the Commissioners of Hall County near Abbott. Address C. H. Menck, County Clerk, Grand Island. (See Wood River, Neb., below.)

ALLEN TOWN, PA.—Mayor Schaadt, in a communication to the Council last week, said that the necessity for a bridge over the Lehigh Valley Railroad tracks at Summer Ave., at North Seventh St., is not imperative at the present time. The estimated cost of this bridge with the abutments is from \$15,000 to \$20,000. (March 31, p. 233.)

Viewers have reported in favor of a new bridge over Cedar Creek, south of Whitehall Township.

ANDALUSIA, ALA.—An iron bridge about 200 ft. long and estimated to cost between \$4,000 and \$5,000, will be built by Covington County over the Conecuh River. Contracts for this work will be let the second Monday in August by the County Court. H. B. O'Neal may be addressed.

ATLANTA, GA.—An additional appropriation of \$1,500 has been made for bridges.

ATLANTIC CITY, N. J.—Bids are wanted Monday, June 19, by Stewart H. Shinn, Chairman of the Bridge Committee, for an iron bridge across Mullica River in Mullica Township.

BAY CITY, MICH.—A steel bridge, with a span of 35 ft. over a branch of the Kawkawlin River, is said to be under consideration by the County Commissioners.

BERLIN, ONT.—The counties of Wellington and Waterloo will soon ask bids for building an iron bridge at Wallenstein. Address H. J. Bowman, Engineer, Berlin.

BOSTON, MASS.—State Comptroller Shaw is receiving bids for \$6,385,000 bonds, all 3%, of which \$250,000 is to go toward the abolition of grade crossings.

BUFFALO, N. Y.—Bids were opened by the Grade Crossing Commission June 3, for the superstructure of the viaduct bridge to be built over the railroad tracks on Abbott road. (June 2, p. 391.) Two proposals were offered: (1) For doing the work under provision of labor laws and city ordinances if strictly enforced; (2) without reference to these laws and ordinances. The bids were: Toledo Bridge Co., (1) \$132,937; (2) \$132,186. Buffalo Bridge & Iron Works, \$139,128. King Bridge & Iron Co., \$151,655. Edge Moor Bridge Works, (1) \$157,960; (2) \$154,490. Pennsylvania Steel Co., \$140,765. Penn Bridge Co., Beaver Falls, Pa., (1) \$135,431; (2) \$133,871. Elmira Bridge Co., (1) \$147,690; (2) \$146,690. The contract for the substructure was let to Frank J. Read for \$68,669.

CARROLLTON, ALA.—Bids will soon be asked for an iron bridge over Sipsey River, to be built jointly by Pickens and Greene counties. Address, L. C. Hendgins, Probate Judge, Carrollton.

CENTRALIA, WASH.—The Commissioners of Lewis County want bids for putting in a bridge over the Newaukum River on the La Bree road, near the County Poor Farm.

CHATHAM, ONT.—Tenders are wanted by J. C. Fleming, Clerk of County Kent, for a steel highway bridge of 30 ft. clear span, with steel pile abutments, across Fancher Creek, near the village of Florence.

CHICAGO, ILL.—It is announced that the plans for a bridge and viaduct, and for a subway, connecting the North and South Sides, as noted in our recent issues, will not be completed before the City Council adjourns for the Summer, so no action can be taken until the Fall. Two sets of plans will be prepared, one set for a bridge and viaduct and one set for a subway.

CLEVELAND, O.—Plans for the new Willson Ave. bridge, according to report, are completed. It is said the "Nickel Plate" road will pay the greater part of the expense.

COLFAX, CAL.—W. A. J. Edinger will build a dam and bridge over the American River at Colfax.

COQUILLE, ORE.—Proposals will be received by the County Court of Coos County until 2 p. m. July 8 for plans, specifications, etc., and for bids for building a bridge according to such plans across the middle fork of the Coquille River. State specifically the kind and quality of timber proposed to be used. The main span to be 135 ft. and about 43 ft. above low water mark. Apron on south bank to be about 33 ft. and on north bank about 30 ft. L. Harlocker, County Judge. A check for 5% of the amount must accompany proposals.

CORVALLIS, ORE.—Judge Burnett, the retiring Mayor, has recommended that the city build a new bridge across the Willamette.

CRANSTON, R. I.—Dean & Westbrook, of New York, according to report, have the contract at \$7,200 for the new bridge on Narragansett Ave. (March 17, p. 195.)

CREEDE, COLO.—The Commissioners of Mineral County are receiving bids for a wooden bridge 116 ft. long, to be built over the Rio Grande, in the city of Creede. The bridge will cost \$1,500. Sid. B. Rinsen, City Engineer.

DAYTON, O.—All the bids received by City Comptroller Robert H. Ferguson May 31 for a steel girder



bridge across Miami and Erie Canal, at Wayne Ave., have been rejected. Following are the bids received: King Bridge Co., (1), \$3,983; (2), \$4,467; (3), \$4,325; (4), \$4,082; New Columbus Bridge Co., \$5,350; Youngstown Bridge Co., \$5,300; Massillon Bridge Co., plan 1, \$5,100; plan 2, \$4,900; Pittsburgh Bridge Co., \$5,200; Toledo Bridge Co., plan 1, \$4,980; plan 2, \$5,018; Lafayette Bridge Co., \$4,750; J. G. Wagner & Co., Milwaukee, Wis., \$4,700.

**DOWNS GROVE, ILL.**—Two steel bridges are said to be in consideration by the Street and Alley Committee of the Town Council.

**EASTON, PA.**—The Nazareth Traction Co. will probably build a trestle over Bushkill Creek from Spring Garden St.

**FRANKFORT, IND.**—The Commissioners of Clinton County will receive bids until June 19, at the Auditor's office, for two steel Pratt truss bridges, one 120 ft. and one 80 ft. long. They are to be built over Kilmore and Middle Forks of Wild Cat Creek. The contracts will be let according to the plans on file and in accordance with the provisions of the County Reform Law of the late Legislature and approved March 3. Address J. R. Brown, Frankfort.

**GENEVA, N. Y.**—A meeting of the Railroad Commissioners was held at Geneva June 8 to consider plans for bridges to cross the New York Central & Hudson River RR. at Avenues B and C. The cost of an overhead crossing at Ave. B is estimated at \$12,000. Another bridge, estimated to cost \$15,000, is also under consideration at Ave. E.

**GLENDIVE, MONT.**—It is estimated that \$40,000 will be the cost of replacing the bridge which was destroyed several months ago. (May 19, p. 357.)

**GRAND RAPIDS, MICH.**—F. W. Hunter, Mayor's Secretary, informs us that there is small probability that the proposed new bridge at Bridge St., in Grand Rapids, will be built this season. The present structure is in good condition, the only objection is that it is not wide enough to accommodate the traffic. (May 26, p. 377.)

**GREENWOOD, MISS.**—We are informed that bids will be received July 3 for an iron bridge over Alligator Slough, in Greenwood, to be built by the Commissioners of Leflore County. G. E. Williamson, County Clerk.

**GUELPH, ONT.**—Tenders are wanted by J. Hutchison, C. E., for two steel highway bridges as follows: One at Fergus, Ont., to be 150 ft. span and the other near Bosworth to be 118 ft. span.

**HOT SPRINGS, ARK.**—The Commissioners of Garland County, we are informed, will ask bids about Nov. 1, for a steel truss bridge 691 ft. long, to be built over Ouachita River, at Hot Springs. The bridge is estimated to cost \$34,985. The plan for the bridge calls for four Baltimore trusses, 172 ft. each. A. R. Voshell, Hot Springs.

The following are the bids received for the steel highway bridge at Garner's Ferry and opened June 1: Geo. E. King Bridge Co., Des Moines, Ia., \$37,500; A. M. Blodgett, Kansas City, Mo., 37,000; Indiana Bridge Co., Muncie, Ind., 36,000; M. S. Hasie, Jr., Fort Worth, Tex., 35,700; Missouri Valley Bridge Co., 35,500; St. Louis Bridge & Iron Co., St. Louis, Mo., 34,900; Groton Bridge Co., Groton, N. Y., 34,985. The bridge will be of four spans, each of 171 ft. on cylinder piers.

\* Contract awarded (May 26, p. 377).

**HOUGHTON, MICH.**—Press reports state that the Senate has passed a bill providing for a new bridge over Sturgeon River.

**INDIANAPOLIS, IND.**—The Indianapolis, Martinsville & Southern RR. Co., which is now surveying, will need four bridges. The average length of each is 30 ft. Address Wm. A. Pickens, Indianapolis.

Superintendent Power, of the Park Board, has extended the time for opening bids on the suspension bridges at Riverside Park until the last Friday in June.

**JACKSONVILLE, FLA.**—The viaduct which the Atlantic, Valdosta & Western RR. will build across Duval St., at its intersection with Catherine St. for an entrance into the city, will necessitate the change of grade of these streets. An ordinance before the City Council requires that the viaduct shall have no steeper grade or rise than 4.25 ft. in 100 ft.

**LEWISBURG, PA.**—The Commissioners of Union County will receive proposals until June 22 for building a bridge over Penns Creek, in Hartley Township. Separate proposals are wanted for the iron or steel superstructure, and for the stone sub-structure of masonry. Plans and specifications can be seen at the Commissioners' office, Lewisburg, Pa. A. A. Gemberling, S. O. Harbeson, James Pursley, Commissioners.

**MADISON, ARK.**—The Choctaw & Memphis RR., we are informed, will build a steel bridge over the St. Francis River, near Madison.

**MARIETTA, O.**—The City Clerk will soon receive proposals for an iron bridge about 600 ft. long which is to be built over the Muskingum River, in Marietta. The estimated cost is \$70,000. Address W. A. Patterson, Marietta. (May 5, p. 321.)

**MARION, ALA.**—An iron bridge 100 ft. long will be built by Perry County over Cahawba River. The total cost is estimated at \$4,000. Bids are wanted June 21. Address G. P. White, County Commissioner, Perry County, Marion.

**MENDOCINO, CAL.**—The contract for the iron bridge over Big River, near Mendocino, was let by the County Commissioners for \$7,493.

**MILES CITY, MONT.**—Bids are wanted June 26 by A. H. Swedfiger, Clerk of Custer County, for two wagon bridges, one over Powder River to replace the one destroyed last month, and the other over Mispah Creek.

**MONTESANO, WASH.**—Bids are wanted by July 1 for building bridges on the John Richardson road across the Little Hoquiam River, at New London, according to plans and specifications on file in County Auditor's office. J. A. Seels, County Auditor, Montesano.

**NEEDLES, CAL.**—An iron bridge will soon be built by San Bernardino County over the Mojave River, in Needles. Address J. H. West.

**NEW YORK, N. Y.**—The Amsterdam Construction

Co. was incorporated June 8, with a capital stock of \$10,000, to build bridges in any part of the United States and Canada. The office will be in New York City. The incorporators are: Jas. E. La More, John Cooper, Albert A. Wigand, all of New York City.

The Board of Trade of the Seventeenth Ward, Brooklyn Borough, is endeavoring to have a viaduct bridge built over Newtown Creek, to take the place of the present drawbridge.

**OAKLAND, CAL.**—The War Department has granted an extension of time until Oct. 1 for completion of the Webster St. bridge. (Dec. 2, 1898, p. 866.)

**ORILLIA, WASH.**—Bids will be received June 23 for the drawbridge across White River to be built by King County. Address E. H. Evenson, Clerk of the Board of County Commissioners.

**PATERSON, N. J.**—The Finance Committee of the Freeholders have decided to sell \$33,000 of 5% bridge bonds, to mature in 1904.

**PITTSBURGH, Pa.**—The Highland Park Bridge Co. was chartered June 12 to build a bridge over the Allegheny River, on the line of Butler St., Pittsburgh, to a point opposite at 22d St., in the Borough of Sharpsburg. The incorporators are: A. L. Schultz, J. Frank Pepper, Otto G. Schultz, John Hays and A. H. Gibson.

**QUEENSBURY, N. Y.**—Bids are wanted June 16 for the substructure and superstructure for two wrought iron or steel bridges across Halfway Brook on Bay Head road. Daniel P. DeLong, Supervisor.

**REDOAK, ILL.**—An iron bridge 95 ft. long over Richland Creek is said to be under consideration.

**RICHMOND, VA.**—The Richmond, Petersburg & Carolina and the Chesapeake & Ohio have been granted permission by the Council to build a viaduct in connection with other improvement work, to cost probably \$350,000.

**ST. PAUL, MINN.**—City Bridge Engineer A. Munster informs us that bids will probably be received in the early part of July by the City Clerk for an iron bridge 600 ft. long, of three Pratt deck spans each 173 ft. long, and one plate girder span. The contract for the foundations has already been let to Chas. Stone. The total estimated cost is \$115,000.

The contracts for the substructure and superstructure of the Raymond Ave. bridge was recently let for \$50,000.

**SALINA, KAN.**—A. L. Brown, County Clerk, will receive bids until June 17 for three steel bridges to be built by the county.

**SAN DIEGO, CAL.**—An ordinance has been introduced in the Council to have the India St. bridge raised and repaired. Probable cost, \$400.

**SAUK RAPIDS, MINN.**—According to reports, bids are wanted until June 27 for repairing the wagon bridge across the Mississippi River at this place. Several weeks ago it was said a new bridge was contemplated at this place. Address A. E. Kasner, County Auditor.

**SMITHBORO, N. Y.**—Tioga and Nichols Bridge Company was incorporated in New York June 9 to build a toll bridge across the Susquehanna River, near the village of Smithboro, Tioga County. The capital stock is \$30,000. Among those interested are: Harry B. Winters and Eugene E. Bailey, of Smithboro.

**SMITHVILLE, TEX.**—The new iron railroad bridge which is being built over the Colorado River at Main St. was swept away during a heavy storm, June 7. The estimated loss to the contractors is placed between \$10,000 and \$12,000. The bridge, when completed, was to cost \$25,000.

**SOUTH WINDHAM, ME.**—Libbey & Wescott have been awarded a contract to build a bridge across the Little River from South Windham for an electric railroad.

**WASHINGTON, D. C.**—The Toledo Bridge Co. has the contract for the foundations and superstructure of the Pratt truss iron bridge, 350 ft. long, to be built over Piney Branch, in Rock Creek Park, Washington. The estimated cost is \$11,000. (May 5, p. 321.)

The following are the bids received for the Rock Creek Bridge:

Toledo Bridge Co., Toledo, O.,	\$10,981
Berlin Iron Bridge Co., East Berlin, Conn.,	11,636
*Berlin Iron Bridge Co., East Berlin, Conn.,	9,207
Penn Bridge Co., Beaver Falls, Pa.,	12,709
Wrought Iron Bridge Co., Canton, O.,	13,300
Groton Bridge & Mfg. Co., Groton, N. Y.,	14,216
*Structural Iron Co., Baltimore, Md.,	14,277
McGuire & Hall, 26 Cortlandt St., New York,	10,275
*Stacy B. Opdyke, Philadelphia,	13,735
*Stacy B. Opdyke, Philadelphia,	10,275
*F. R. Long Co., New York,	10,121
*F. R. Long Co., New York,	15,554
Youngstown Bridge Co., Youngstown, O.,	18,000
Youngstown Bridge Co., Youngstown, O.,	11,702

\* Alternative design; † incomplete bid. The plans for the proposed \$225,000 bridge across Rock Creek from Massachusetts Ave. have been approved by Gen. John M. Wilson, Chief of Engineers, U. S. Army. The bridge will be a stone arch structure with a span of 50 ft. The Crawford Paving Co. has the contract for the foundations.

Plans are in consideration for Memorial Bridge across the Potomac River, Congress, at the last session, appropriated \$5,000 for estimates and designs. According to press reports, plans are in consideration to abolish two grade crossings of the Baltimore & Ohio and the Baltimore & Potomac railroads, on points north of the Benning Road.

**WELLAND, ONT.**—Tenders will soon be called for rebuilding the Tea Creek bridge in Willoughby township. Donald Dell, Clerk.

**WESTFIELD, MASS.**—The Woronoco St. Ry. Co. is receiving bids for superstructure for three bridges. They are: Westfield River bridge, two spans; bridge over B. & A. RR., one span; bridge over Powder Mill Brook. James H. Bryan, President.

**WILLIAMSPORT, IND.**—Bids are wanted until June 23 for six iron bridges to be built by Warren County. Address E. C. Livengood, Chairman of the County Commissioners.

**WOOD RIVER, NEB.**—Bids are wanted by July 1 for a county bridge at this place, by C. H. Menck, County Clerk. (See Abbott, Neb., above.)

## MEETINGS AND ANNOUNCEMENTS.

## Dividends.

Chicago Great Western.—Semi-annual, preferred A, 1½ per cent., payable July 1.  
Chicago Junction Rys. & Union Stock Yards.—Quarterly, preferred, 1½ per cent.; semi-annual, preferred, 4 per cent., payable July 1.  
Little Schuylkill Nav. RR. & Coal Co.—Dividend of \$1.50 per share declared, payable July 6.  
New York & Harlem.—Semi-annual, 4 per cent., payable July 1.  
New York, New Haven & Hartford.—Quarterly, 2 per cent.  
Oregon RR. & Navigation.—Preferred, 2 per cent., payable July 1.

Manhattan Ry.—Quarterly, 1 per cent., payable July 1.

Union Passenger Ry. (Phila.).—Dividend of \$4.75 per share, payable July 1.  
West Philadelphia Passenger Co.—Dividend of \$5 per share, payable July 1.

## Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association of General Baggage Agents.—The annual convention will be held at Charlevoix, Mich., Monday, June 19. J. E. Quick, Grand Trunk Ry., Toronto, Can., Secretary.

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Railway Master Mechanics' Association.—The thirty-second annual convention will be held at Old Point Comfort, Va., beginning Monday, June 19. John W. Cloud, Secretary, The Rookery, Chicago.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m. The annual convention will be held June 27-30, at Cape May, N. J., Stockton Hotel.

American Society of Railway Superintendents.—The annual convention will be held at Detroit, Mich., beginning Sept. 20. C. A. Hammond, Secretary, Asbury Park, N. J.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2020 State St., Chicago.

Association of American Railway Accounting Officers.—The annual convention will be held at Montreal, Can., June 28. C. G. Phillips, Secretary, Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges & Buildings.—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Roadmasters' Association.—The annual convention will be held at Toronto, Sept. 20. J. Drinkwater, Secretary, Winchester, Ont.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Eastern Maintenance of Way Association.—The annual convention will be held Aug. 16 at Portland, Me. F. C. Stowell, Ware, Mass., Secretary.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month at 7.30 p. m.

International Association of Car Accountants.—The annual convention will be held at Saratoga, N. Y., June 20. G. S. Russell, Secretary, Cedar Rapids, Ia.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car & Locomotive Painters' Association.—The annual convention will be held Sept. 12 at Philadelphia, Pa. Robert McKeon, Secretary, Kent, O.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

National Association of Car Service Managers.—The annual meeting will be held June 19 at Niagara Falls, N. Y.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-



first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

**Northwest Railway Club.**—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

**Northwestern Track and Bridge Association.**—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

**Roadmasters' Association of America.**—The annual convention will be held in Detroit, Mich., Sept. 12. J. B. Dickson, Secretary, Sterling, Ill.

**St. Louis Railway Club.**—Holds its regular meeting on the second Friday of each month at 3 p. m.

**Southern and Southwestern Railway Club.**—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

**Technical Society of the Pacific Coast.**—Meets at its rooms, in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

**Train Dispatchers' Association of America.**—The annual convention will be held at Milwaukee, Wis., June 20. John F. Mackie, Secretary, Chicago.

**Traveling Engineers' Association.**—The annual convention will be held in Cincinnati, O., Sept. 12.

**W. O. Thompson, Secretary, Elkhart, Ind.**

**Western Foundrymen's Association.**—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

#### Western Society of Engineers.

A meeting of the Western Society of Engineers was held in its rooms in the Monadnock Block, Chicago, Wednesday evening, June 7. Mr. W. T. Casgrain, Civil Engineer, Detroit, Mich., read a paper entitled "City Subways," which was illustrated by stereopticon views.

#### St. Louis Railway Club.

The regular June meeting of the St. Louis Railway Club will be passed and the next meeting will therefore be Friday, September 8. The June proceedings will be issued, however, and will contain a paper by Mr. X. P. Alexander, Division Foreman of the St. Louis & San Francisco, entitled "Economic Locomotive Firing." Proceedings will also be published in July and August the same as last year.

#### Engineers' Club of Cincinnati.

The 106th regular meeting of the Club occurred on May 18, at the rooms of the Literary Club. Dinner was served at 6.15 P. M., and the regular meeting called to order at 7.25 P. M., with President Hazard in the chair and 18 members and 11 visitors present. Two new members were elected. The committee appointed to prepare a memoir of Mr. Fred. C. Weir, who died April 1, presented a sketch of his life, which was ordered received and entered on the records of the Club.

The paper for the evening was read by Mr. John F. Earhart, on the subject of "Color."

#### Accounting Officers.

The Association of American Railway Accounting Officers will hold its eleventh annual meeting at the Windsor Hotel, Montreal, beginning June 28. Secretary C. G. Phillips, of Chicago, has issued to members a programme of what is to be done at the meeting, including the reports of the principal committees. The Executive Committee reports a series of questions concerning classification of operating expenses which were submitted by the Statistician of the Interstate Commerce Commission and have been answered by the committee. The answers are given in full. Among these questions is one concerning payments for cartage of freight, which, according to the question, as stated, is customary with the railroads in Canada "at all the large cities." It appears, however, that a certain rate is added to the freight charges for the amount of cartage. The committee decides that where separate agents are hired to do the cartage and the cost is credited to freight earnings the amount should be charged to freight earnings.

The special committee on train and locomotive mileage makes a report, giving rules in great detail for the classification of train and locomotive mileage, with rules for computing mileage.

A sub-committee of the Executive Committee reports a cipher code suitable for use in the car service, the freight auditing, the ticket auditing and the general freight departments, and with separate codes for titles of officers and for the names of all the principal railroads and car lines in the country.

The other committees which are to report at the meeting are the standing freight committee, the standing passenger committee, the committees on disbursements and on car accounts and miscellaneous revenue accounts.

#### PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. Desmond FitzGerald, President Am. Soc. C. E., has been appointed Chief Engineer of the State Commission which is to inspect the Chicago drainage channel. Active work of inspection will begin at once.

—Mr. J. A. F. Aspinall, hitherto Chief Mechanical Engineer, has been appointed General Manager of the Lancashire & Yorkshire, succeeding Mr. J. H. Stafford. Our readers must be very familiar with the name of Mr. Aspinall, who has distinguished himself in the Locomotive Department, and some of them have had the privilege of visiting the famous Horwich shops with him.

—The successor of Sir William Birt as General Manager of the Great Eastern Railway of England is Mr. J. F. S. Gooday, hitherto General Manager of the London, Brighton & South Coast. Mr. Gooday was for a long time Manager of the Continental Traffic Department of the Great Eastern and has been with the Brighton Company only about a year and a half. The successor of Mr. Gooday on the Brighton road is Mr. William Forbes, heretofore Assistant General Manager of the South-Eastern Railway.

—Mr. T. G. Shaughnessy, who succeeds Sir William Van Horne as President of the Canadian Pacific Railway, was born in Milwaukee, Wis., in 1853. He entered railroad service in 1869 in the purchasing department of the Chicago, Milwaukee & St. Paul, and

eventually became General Storekeeper of that railroad. In 1882 Mr. Van Horne took Mr. Shaughnessy to the Canadian Pacific as General Purchasing Agent and he has been in the service of that railroad ever since, having passed from the purchasing department to the operating department and latterly having been Vice-President.

—Mr. W. H. Marshall, Assistant Superintendent of Motive Power and Machinery of the Chicago & Northwestern, has been appointed Superintendent of Motive Power of the Lake Shore & Michigan Southern, to succeed Mr. George W. Stevens, who has resigned. Mr. Marshall has held his position with the Chicago & Northwestern for a little over two years, and before assuming it he was Editor of the American Engineer and before that Mechanical Editor of the Railway Master Mechanic and of the Railway & Engineering Review. His earlier experience was gained at the Rhode Island Locomotive Works and in consulting engineering work.

—Mr. B. D. Caldwell has resigned his position as Chairman of the Western Passenger Association, at Chicago, which he has held for the last seven years, and on July 1 will become General Traffic Manager of the Delaware, Lackawanna & Western. Mr. Caldwell's experience hitherto has been wholly in the passenger department, so that his selection for such an important post, where he will have to deal with both freight and passenger traffic, is a marked compliment to his general ability. Mr. Caldwell's administration of the chairmanship at Chicago, an exceedingly difficult place, has been highly satisfactory, and the passenger men of the West are pronounced in their expressions of regret at his departure. Mr. Caldwell was born at Placerville, Cal., in 1858. He began his railroad service in the Auditor's office of the Vandalla Line in 1875, was later transferred to the passenger department, went from that road to the Missouri Pacific, and for four years, 1888 to 1892, was Assistant General Passenger Agent of the latter road.

—Sir William C. Van Horne, K. C. M. G., has declined to serve longer as President of the Canadian Pacific Railway, but becomes Chairman of the Board of Directors. Mr. T. G. Shaughnessy succeeds him as President. Sir William Van Horne was born in Illinois, in 1843. He began his railroad career as a telegraph operator on the Illinois Central Railroad in 1856. He served then on various railroads as operator, agent and train dispatcher and superintendent of telegraph and division superintendent until 1872, when he became the General Superintendent of the St. Louis, Kansas City & Northern. Then he went steadily up through various grades on various railroads until he became General Superintendent of the Chicago, Milwaukee & St. Paul in 1880. Two years later he went to the Canadian Pacific as General Manager, and in 1884 became Vice-President of that company. Later he became President, and has remained continuously in the service of the Canadian Pacific since January, 1882. A few years ago he received the decoration of Honorary Knight Commander of the Order of St. Michael and St. George. His administration of the Canadian Pacific has been highly intelligent and enterprising, and he is a fortunate man to be able to devolve now some of the arduous duties of his office upon a worthy successor.

—Mr. W. F. Hallstead, Second Vice-President and General Manager of the Delaware, Lackawanna & Western Railroad, has resigned. The office of General Manager will be vacant for the present, but Mr. E. G. Russell, Division Superintendent, will be made General Superintendent. Mr. Hallstead was born in Luzerne County, Pa., in 1837. He entered railroad service in 1852 and has been in the service of the one railroad during his entire life. He has passed through many different grades from brakeman up. Mr. Hallstead is one of comparatively few railroad officers of the old school remaining now in service. By the "old school" we mean those men who administer their departments in the simple old-fashioned way of personal attention to all details and to all individuals. Mr. Hallstead has always been in close contact with his road and his employees; he knows his conductors and his engineers personally and they know him and know exactly what to expect from him, namely, justice and consideration and great promptness and vigor if they fall short of their duties. Mr. Hallstead is a man of so much mental and physical energy that we should suppose his services would have been valued and desired for a good many years to come, but it is easy to see that his notions might be very different from those of a considerably younger man trained on a great Western railroad.

#### ELECTIONS AND APPOINTMENTS.

**Atlantic & Yadkin.**—J. M. Culp has been appointed Traffic Manager, with headquarters at Washington, D. C.

**Baltimore & Ohio.**—G. W. Martin has been appointed Trainmaster, succeeding U. B. Williams, transferred.

**Canadian Southern.**—Henry B. Ledyard, President of the Michigan Central, has been elected a Director of the C. S., succeeding James Tillinghast, deceased.

**Canadian Pacific.**—Sir Wm. C. Van Horne becomes Chairman of the Board of Directors, and Mr. Shaughnessy succeeds him as President. (Further notice will be found under "Personals.")

**D. McNicoll** has been appointed Assistant General Manager. **R. Kerr**, heretofore Traffic Manager of the Western and Pacific divisions, with headquarters at Winnipeg, Man., has been appointed Passenger Traffic Manager, and **C. E. McPherson**, heretofore Assistant General Passenger Agent at Toronto, Ont., has been appointed Traffic Manager of the Western and Pacific divisions, succeeding R. Kerr.

**Central Vermont.**—J. A. Allen, Trainmaster at New London, Conn., has resigned.

**Chicago & Eastern Illinois.**—At the annual meeting of the stockholders F. S. Flower was elected a Director.

**Cleveland, Akron & Columbus.**—C. F. Daly, General Passenger Agent, with headquarters at Cleveland, O., has resigned.

The new officers of this company, whose property is now controlled by the Pennsylvania, are as fol-

lows: President, James McCrea; Vice-President, Joseph Wood; Secretary, S. B. Liggett, and Treasurer, J. J. Sullivan. The new Directors are: James McCrea, J. T. Brooks, Joseph Wood and E. B. Taylor, of Pittsburgh; D. S. Grey, of Columbus; Andrew Squire and Charles Brooks, of Cleveland.

**Chicago, Rock Island & Pacific.**—At the annual meeting of stockholders, held June 7, H. A. Parker was elected First Vice-President and Robert Mather was elected Second Vice-President. At the same meeting W. A. Nash and A. R. Flower, of New York, were elected Directors.

**Clarion River.**—The officers of this company are as follows: President and General Manager, B. E. Cartwright; Vice-President, Frank S. Smith; Secretary, Treasurer and Auditor, H. S. Hastings, and General Freight and Passenger Agent, L. P. Snyder. (See Railroad news column, April 21, p. 291.)

**Delaware, Lackawanna & Western.**—Wm. F. Hallstead, Second Vice-President and General Manager, with headquarters at Scranton, Pa., has resigned and the office of General Manager will for the present remain vacant. E. G. Russell, heretofore Division Superintendent at Hoboken, N. J., has been appointed General Superintendent. B. D. Caldwell, heretofore Chairman of the Western Passenger Association, has been appointed General Traffic Manager of the D. L. & W.

**Des Moines & Fort Dodge.**—At a meeting of the stockholders, held June 1, A. R. Flower was elected Vice-President and F. E. Hayne, of Chicago, was elected a Director, succeeding J. F. Phillips, deceased.

**Federal District R.R., of Mexico.**—Juan Mendoza y Roca has been appointed Chief Engineer and John A. Smith Master Mechanic, with headquarters at City of Mexico.

**Florida East Coast.**—J. E. Ingraham, of St. Augustine, Fla., has been elected Third Vice-President.

**Fort Worth & Rio Grande.**—W. H. Reilly has been appointed Master Mechanic, with headquarters at Fort Worth, succeeding T. J. Shellhorn, resigned. Effective June 10.

**Jamestown & Chautauqua.**—F. C. Lay has been appointed Assistant Auditor, succeeding O. W. Kelsey.

**Kansas City & Independence Air Line.**—W. L. Stevenson, heretofore Superintendent, with headquarters at Kansas City, Mo., has been appointed General Superintendent.

**Kansas City & Northern Connecting.**—E. H. Shaulfer has been appointed General Manager, succeeding Robert Gillham, deceased. Effective May 20. L. F. Moore has been appointed General Freight Agent, with headquarters at Kansas City, Mo. Effective June 5.

**Kansas City, Pittsburgh & Gulf.**—J. A. Edson, heretofore General Superintendent of the St. Louis Southwestern at Tyler, Tex., has been appointed General Manager of the K. C., P. & G., with headquarters at Kansas City, Mo. Effective June 8. A. F. Rust has been appointed Resident Engineer, with headquarters at Texarkana, Tex. A. L. Howe, heretofore Assistant Treasurer, has been elected Treasurer. The office of Engineer Maintenance of Way is abolished.

**Keokuk & Des Moines.**—At a meeting of the stockholders held June 7 R. M. Hoe was elected a Director, succeeding David Dowes, Jr., deceased.

**Keokuk & Western.**—R. D. Lewis, Purchasing Agent, with headquarters at Keokuk, Ia., has resigned, and hereafter the purchasing will be done by A. C. Goodrich, Vice-President and General Manager.

**Lake Shore & Michigan Southern.**—W. H. Marshall, heretofore Assistant Superintendent Motive Power and Machinery of the Chicago & Northwestern, has been appointed Superintendent of Motive Power of the L. S. & M. S., succeeding G. W. Stevens, resigned. Effective at once.

**Lehigh Valley.**—Francis R. Twichell has been appointed Auditor of Passenger Receipts, succeeding Edward M. Tacy, resigned.

**Missouri Pacific.**—Thomas Fielden, of St. Louis, Mo., has been appointed Assistant Master Mechanic, succeeding W. T. New, resigned.

**Mobile & Ohio.**—R. H. Duesberry has been appointed Purchasing Agent, with headquarters at Mobile, Ala., instead of Acting Purchasing Agent, as incorrectly stated in our issue of June 2, p. 393.

**New York, Susquehanna & Western.**—H. E. Gilpin, heretofore Division Superintendent of the Erie, with headquarters at Hornellsville, N. Y., has been appointed Superintendent of the N. Y., S. & W., succeeding E. E. Loomis, resigned.

**Oregon Short Line.**—James A. Weed has been appointed Superintendent of Bridges and Buildings of the Montana & Utah Division, with headquarters at Pocatello, Ida., succeeding J. M. Bennett, transferred.

**Pennsylvania.**—A. J. Cassatt, one of the Directors of the company, has been chosen by the board to be President in place of Frank Thomson, deceased. James McCrea has been elected a director to succeed Mr. Thomson. Mr. McCrea is First Vice-President of the Pennsylvania Lines west of Pittsburgh, with office at Pittsburgh. J. F. Chandler has been appointed Supervisor of Division F, succeeding A. R. Fillebrown.

**St. Joseph & Grand Island.**—J. F. Elder has been appointed Auditor and Cashier, succeeding J. G. Drew, resigned.

**St. Louis Southwestern.**—Frank H. Britton, heretofore Division Superintendent of the Great Northern at Larimore, N. D., has been appointed General Superintendent of the S. L. S., with headquarters at Tyler, Tex., succeeding J. A. Edson, resigned.

**Southern.**—T. E. Harwell has been appointed Master Mechanic, with headquarters at Mobile, Ala.

**Toronto, Hamilton & Buffalo.**—At a meeting of the stockholders held at Toronto, Can., June 6, Samuel



R. Callaway, President of the New York Central & Hudson River, was elected a Director.

Virginia & Southwestern.—Dayton H. Miller has been appointed Auditor.

Wisconsin, Minnesota & Pacific.—The officers of this company are as follows: President, F. B. Kellogg; Vice-President, A. B. Stickney; Treasurer, C. A. Kalman; Secretary, W. J. Conway, and General Manager, S. C. Stickney. The Directors are: F. B. Kellogg, A. B. Stickney, C. A. Severance, Kenneth Clark, R. C. Wright.

West Virginia Central & Pittsburgh.—D. C. Courtney has been appointed Superintendent of Motive Power, with headquarters at Elkins, W. Va., succeeding R. O. Cumrack, resigned.

#### RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

ALABAMA & FLORIDA.—This road is completed from Gloriana, Ala., to Andalusia, with the exception of the bridge over the Conecuh River, and it is stated that the property will be turned over to the Nashville & Louisville for operating on July 1. (April 7, p. 252.)

ALABAMA ROADS.—John T. Cochrane, of Tuscaloosa, Ala., is pushing a movement for a railroad from Carrollton to connect with the Montgomery Division of the Mobile & Ohio, about seven miles. Citizens of Carrollton have subscribed over \$10,000.

Trains are running on the new line of the Pioneer Mining & Manufacturing Co., from Thomas, Ala., to the company's new coal fields at Sayrtan, four miles. F. B. Keiser, of Thomas, is Superintendent. (Feb. 10, p. 107.)

ARIZONA ROADS.—The Detroit Copper Co., according to report, has made surveys for a line from Morenci either to Guthrie, 20 miles, or to Solomonville, 35 miles.

ARKANSAS & CHOCTAW.—No building has been completed on this line during the year, though the line is located through the Choctaw Nation, 60 miles, nearly to Goodland, on the St. Louis & San Francisco. Maps have been filed and approved by the Department of Interior at Washington. It will be some six months before the line is located through the remainder of the Choctaw and Chickasaw nations. The company does not contemplate building until the line is entirely located, some 300 miles. (March 17, p. 197.) F. W. Valliant, of Durant, I. T., is Chief Engineer. (Official.)

ATLANTA, KNOXVILLE & NORTHERN.—The General Manager writes that his company will spend considerable money on the Tennessee Division, lowering grades and rebalasting. They have now at work on the division two steam shovels, with the necessary equipment and men. The company also has in contemplation an extension from Marietta, Ga., south about 20 miles to Atlanta, and will begin location shortly. (May 5, p. 323; June 9, p. 417.)

BELLINGHAM BAY & BRITISH COLUMBIA.—The General Superintendent writes that the company has a gravel train at work rebalasting the road, and they are putting in a large number of ties and filling some of the trestles. They are building one mile of logging spur at Goshen, Wash., and have made surveys for 25 miles of extension into mines. (May 12, p. 343.)

BLACKWELL & SOUTHERN.—This company was incorporated in Oklahoma June 2, with a capital stock of \$350,000, to build a railroad from Blackwell south about 40 miles to Perry. The incorporators are officials of the Atchison, Topeka & Santa Fe.

CANADIAN PACIFIC.—Surveys are reported in progress for a connecting line from Mattawamkeag, Me., southeast about 50 miles to Princeton.

CANE BELT.—This company, which last year built a line from Eagle Lake, Tex., south 11 miles to Bonus, proposes, according to report, to build extensions from Eagle Lake northeast about 15 miles to Sealy on the Missouri, Kansas & Texas; and from Bonus south about 75 miles through the counties of Wharton, Matagorda and Brazoria to a point on the Gulf of Mexico between the mouths of the Brazos and the Colorado rivers.

CENTRAL OF GEORGIA.—Locating surveys are in progress for the proposed extension from Columbia, Ala., west about 18 miles to Dothan. (Nov. 11, p. 820.)

CENTRAL RAILROAD OF WEST VIRGINIA.—Application has been made for a charter for this road in West Virginia, to run from Reedsville on the new Morgantown & Kingwood southwest through the counties of Preston, Taylor, Barbour, Upshur and Braxton to the Elk River, and thence to Charleston. Captain G. M. Whitescarver, of Grafton, W. Va., and R. L. Devries, of Wheeling, are interested. They are also connected with the Morgantown & Kingwood. (M. & K., Jan. 27, p. 73.)

CHATTAHOOCHEE VALLEY.—The proposed route for the extension of this line from Riverview, Ala., is southeast about 25 miles along the Chattahoochee River to Columbus, Ga. It is proposed to cross the river at Phipps Island, about 20 miles above Columbus. (June 9, p. 417.)

CHATTANOOGA, ROME & SOUTHERN.—With reference to the reports that this company will extend its line to West Point, Ga., the President writes that while the company is looking into the question of extension, no definite conclusion has been reached either as to building or the terminal points. It depends altogether upon the assistance that the people along the road are prepared to give.

CHICAGO, PEORIA, MISSOURI & TEXAS.—This company has been incorporated in Illinois, with a capital stock of \$10,000,000, to build a railroad from Chicago south to the Gulf of Mexico. It is stated that Peoria capitalists are interested.

CHOCTAW, OKLAHOMA & GULF.—Press reports state that 35 miles of the extension from the Arkansas line toward Little Rock will be completed by July, and the entire extension of 164 miles from Wistar, I. T., to Little Rock ready in October. (May 26, p. 379.)

DECKERVILLE, OSCEOLA & NORTHERN.—Grading is completed from Wardell, Ark., to Wil-

son's, 10 miles, and track is being put down by the company's own forces. The line as projected is to run from Deckerville northeast 52 miles, to Blytheville, of which 12 miles to Wardell was built last year. (Oct. 7, p. 732.) E. M. Ford, of Deckerville, is Vice-President and General Manager. (Official.)

DES MOINES VALLEY.—This company has been incorporated in Minnesota to build a railroad from the Iowa State Line, in Jackson County, to run northwest 108 miles, crossing the Chicago & Northwestern at Bingham Lake or Windom, and thence west through Cottonwood, Murray and Pipestone counties to the Dakota line. Among the incorporators are: W. A. Scott, President; J. T. Clark, Vice-President, and E. F. Woodman, Secretary, all of St. Paul, Minn., and officials of the Chicago & Northwestern.

ERIE & WYOMING VALLEY.—A number of curves are being taken out of this line, especially between Scranton, Pa., and Elmhurst.

ESCANABA & LAKE SUPERIOR.—Press reports state that grading is in progress on 15 miles additional of this road from the Escanaba River. It was completed from Escanaba, Mich., to the mouth of the river last year. (March 3, p. 161.)

FLINT & PERE MARQUETTE.—The General Manager writes that the company is at present distributing gravel between Sand Beach, Mich., and Palms, also standard gage rails. After this work is accomplished, it is intended to change the gage and to lay light relaying rails. (June 2, p. 393.)

GREENWICH & JOHNSONVILLE.—The trustees of the village of Greenwich have granted permission to this company to extend its line through that village for the proposed extension to Middle Falls, N. Y. (June 2, p. 393.)

HAWAII ROADS.—Application has been made to the Minister of Interior for a charter for a railroad on the Island of Hawaii, to run from Hilo northeast along the coast through the districts of Hilo, Hamaqua and Kohala. This company is independent of other companies in the island. The incorporators are: Wade J. Browne and Herbert B. Gehr, from the States; Thos. Rain Walker and Francis M. Swanzy, of Theo. H. Davies & Co., Ltd.; John S. Walker, Col. J. W. Jones and Circuit Judge G. K. Wilder. W. O. Smith is Attorney.

IDAHO MIDLAND.—This company has been incorporated in Idaho, with a capital stock of \$15,000,000, to build a railroad from a point on the Oregon Short Line, at the mouth of Boise River, in Canyon County, to run east and northeast via Caldwell, Boise City, Pine Grove, thence over the Divide and Down Salmon River via Vienna, Clayton, Challis, Salmon City and thence north to Gibbonsville to the summit of the Rocky Mountains, on the Montana State Line, an estimated distance of 364 miles. Branch lines are provided to Atlanta, 40 miles; to Custer City, 20 miles, and from Challis to Houston, about 40 miles. The directors are: Thomas W. Bates, President; O. E. Jackson, Secretary and General Counsel; H. E. Neal, George S. Glover and James A. Pinney.

ILLINOIS CENTRAL.—The Canton, Aberdeen & Nashville, from Winfield, Ala., to New River, 8.88 miles, is practically completed. (March 31, p. 235.)

IOWA, MINNESOTA & NORTHERN.—Grading is begun, according to report, on this line from Belle Plaine, Ia., northwest via Parkersburg, Beaumont and Mason City, Ia., to Blue Earth, Minn. It connects two sections of the Chicago & Northwestern, which is supposed to be back of the project. J. M. Whitman, of Fifth Ave. and Lake St., Chicago, is General Manager. (June 2, p. 393.)

LAKE SHORE & MICHIGAN SOUTHERN.—Press reports from Indiana state that about \$1,000,000 is to be expended on the New York, Chicago & St. Louis line, between Fort Wayne and Chicago, including the laying of the whole section with 80-lb. rails.

LOUISVILLE & NASHVILLE.—Grading is progressing at a satisfactory rate on the 40-mile gap from Pineapple, Ala., south to Repton. (Jan. 20, p. 53.)

MANITOBA & NORTHWESTERN.—A large amount of material is being accumulated in Winnipeg, to be used in numerous improvements on this line.

MENOMINEE & ST. PAUL.—This company has been organized at Menominee, Mich., with a capital stock of \$2,000,000, to build a railroad from that city west 300 miles to St. Paul, Minn. Among the incorporators are: Samuel M. Stephenson, President, Menominee; Wellington R. Burt, Saginaw, Mich., President of the Ann Arbor RR., and Henry W. Ashley, Toledo, O.

MICHIGAN CENTRAL.—This company is laying rails on its line from Pelton, Ont., eastward.

MILWAUKEE, BENTON HARBOR & COLUMBUS.—Press reports state that the extension from Buchanan, Mich., south about 15 miles to South Bend, Ind., is to be built this season.

MISCELLANEOUS COMPANIES.—The T. H. Riddle Construction Co. was incorporated in New Jersey June 13, with a capital stock of \$100,000, to build railroads and other work. This company has a contract with the New York Central & Hudson River for the work in progress at Hoffman, N. Y. The incorporators are: T. Henry Riddle and Otto Stillman, of New Brunswick, N. J.

MISSOURI PACIFIC.—A local company has been organized at Perry, Okla., to secure the building of the extension of the branch from Roper, Kan., to Peru Junction, to extend southwest about 125 miles through Oklahoma Territory via Pawhuska to Perry.

MORGANTOWN & KINGWOOD.—The people of Morgantown have voted to issue \$45,000 to aid in building this line from Morgantown, W. Va., east 12 miles to Kingwood. Geo. C. Sturgiss of Morgantown is President. (Feb. 3, p. 93.)

NEW JERSEY MIDLAND.—The proposed line from Paterson, N. J., to Trenton, is to be built under this title. Surveys have been finished from Paterson southwest 17 miles to Morristown, and from Whitehouse southwest 11 miles to Flemington. From Morristown to Whitehouse the tracks of the Rockaway Valley are to be used, and from Flemington into Trenton trackage arrangements have been made

with the Pennsylvania. John E. Mellick of Morristown, N. J., is interested. (New Roads, June 9, p. 417.)

NORTHWEST TERRITORY ROADS.—The Dominion Government has announced that it has decided not to grant any further charters to railroads into the Yukon District from points on United States territory. This will affect a number of bills now before the Legislature, including the Alaska-Yukon, the Alaskan & Northwestern, the Canadian-Yukon and the Yukon-Pacific. The ruling does not apply to railroads proposed entirely within Canadian territory.

NYACK & SOUTHERN.—This company was incorporated in New York, June 12, with a capital stock of \$50,000, to build a railroad in Rockland County, from Sparkill via Piedmont to Nyack, about five miles. Among the incorporators are E. B. Thomas and Geo. M. Cumming, of New York, officials of the Erie.

ONTARIO & RAINY RIVER.—The Dominion Railway Committee has passed the bill granting this company power to buy the Port Arthur, Duluth & Western. A clause is inserted in the bill protecting the creditors. The company is pushing its claim for a subsidy of \$6,400 from the Dominion Government on 200 miles of the proposed line, for 80 miles of which a subsidy is already granted. The Government has given a favorable reply on condition that the road run north of the Lake of the Woods instead of south and through U. S. territory. Provision was made in the bill to protect the town of Port Arthur, which gives the P. A., D. & W. a bonus of \$25,000 in consideration of the location of shops and terminals in that town. (May 26, p. 379.)

PENSACOLA & NORTHWESTERN.—S. M. Van Praag, of Pensacola, Fla., the President of this company, has returned to Pensacola from New York and states that building is to be begun soon. The capital stock is to be increased to \$5,000,000. The road as projected is from Pensacola north 432 miles to Memphis, Tenn. O'Brien & Sheehan, of 253 Broadway, New York, have the contract. (May 26, p. 379.)

PENNSYLVANIA.—A three-mile branch, according to report, will be built from Howard, Center County, Pa., to Jacksonville, to connect with stone quarries.

PEORIA & ST. LOUIS.—Dwight L. Wing, of Springfield, Ill., promoter of this line, is making arrangements, according to report, to begin work. The road as projected is to run from Pekin, Ill., south 55 miles to Springfield. (May 14, 1897, p. 345.)

PORTAGE DU FORT & BRISTOL BRANCH.—A bill is before the Railroad Committee of the Dominion Government to charter this company to build a railroad from Pembroke, Ont., east about 100 miles along the Ottawa River to Hull, Que. It would cross the river at Portage du Fort, a few miles east of Pembroke. A. W. Fraser of Ottawa, Ont., is interested.

RICHMOND, PETERSBURG & CAROLINA.—Right of way is reported secured over the entire line from Richmond, Va., south 107½ miles to Ridgway, N. C. The division from Petersburg south 20 miles was completed last year. (April 7, p. 253.)

RUTLAND & NOYAN.—The Dominion Parliament has granted a charter to this company to build three miles of track to connect the Rutland with the Canada Atlantic, Canadian Pacific and other roads. The company was recently incorporated as an extension of the Rutland. (May 26, p. 379.)

ST. LOUIS, KANSAS CITY & COLORADO.—W. M. Mitchell, of St. Louis, Mo., General Manager, has returned from a trip to New York, where it is said he has made the necessary financial arrangements to extend this line from Union, Mo., west about 120 miles to Versailles. (April 21, p. 289.)

ST. LOUIS SOUTHWESTERN.—Extensions will be made in Texas, according to report, from Leon Junction, in Coryell County, to run southwest about 40 miles to Lampasas, and from Gatesville west about 48 miles to Goldthwaite. Both terminal points are on the Atchison, Topeka & Santa Fe.

SASKATCHEWAN RAILWAY & MINING.—The Dominion Government has granted this company a charter. (Feb. 10, p. 109.)

SOUTHERN.—T. B. Jones & Co., of Baltimore, Md., have the contract for the extension from Cayce, S. C., just below Columbia, to run south 32 miles to Perry on the Carolina Midland. By the terms of the contract it is to be completed by Dec. 1. The contracts will sub-let. (June 9, p. 418.)

SOUTHERN PACIFIC.—Grading is nearly completed on the spur from Surf, Cal., east about 19 miles to Lompoc, and the rails were to be laid by June 15.

Right of way is reported secured for the extension from Oxnard, Cal., south to Hueneme. (July 8, 1898, p. 503.)

Rapid progress is being made on the grading for the loop into Anaheim, Cal. This requires a change of about three miles. (April 7, p. 254.)

Surveys are reported completed for the spur at Madera, Cal., to the Italian-Swiss colony, and it is thought that grading is to be begun at once. (May 19, p. 360.)

STREATOR, HENNEPIN & WESTERN.—This company has been incorporated in Illinois to build a railroad from Streator west to Hennepin, about 30 miles, and thence westward. The incorporators are: F. Plumb, Dr. Heenan, F. M. Ryon, of Streator, and P. Dore, H. B. Zenor, W. H. Casson, M. E. Newburn, of Hennepin.

TEXAS & PACIFIC.—With reference to the report that this company will build an extension from Denison, Tex., to McAlester, I. T., the General Manager writes that no arrangements have been made by the company at present. (June 2, p. 394.)

The only new extension that the company has on hand is one of the Baton Rouge branch from Port Allen, La., north about 25 miles up the west side of the Mississippi to New Rhodes, the county seat of Point Coupee Parish. (April 7, p. 254.)

TORONTO, HAMILTON & BUFFALO.—A deputation from Hamilton, Ont., headed by Mayor Teetzel, has recently interviewed the Government to ask a subsidy for this line between Welland and Brantford.



**WADLEY & MT. VERNON.**—Application has been made to the Georgia Secretary of State for a charter to extend this line from Wadley, Ga., northeast 55 miles to Augusta, and also from Rixville, southwest about 140 miles to Valdosta, in Lowndes County. Work was in progress last year on the first section of five miles south to Pendleton. (Dec. 16, 1898, p. 904.)

**WEST VIRGINIA CENTRAL & PITTSBURGH.**—Senator Stephen B. Elkins, according to report, has decided to build an extension of this line from Bellington, W. Va., northwest 35 miles to Clarksburg, to connect with the new West Virginia Short Line, now building.

**WYOMING SOUTHERN.**—This company has been incorporated in Wyoming, with a capital stock of \$1,000,000, to build a railroad from Fort Steele, Carbon County, to run south about 80 miles to the Colorado State line near its intersection with the North Platte River.

**YANKTON, NORFOLK & SOUTHERN.**—This company was incorporated in Nebraska, June 7, with a capital stock of \$1,800,000, to build the Yankton, Norfolk & Southwestern, to which reference has already been made in these columns. J. S. Meckling, a railroad promoter from Chicago, has been in Iowa recently making arrangements for completing this line from Yankton, S. D., south to Norfolk, Neb., and thence to Omaha, in all 180 miles. The road is owned by Graham & Roby, of Norwalk, O., and about 45 miles was graded in 1892. (March 3, p. 162.)

**YOUKIN-MARRIMAN.**—Under this title a company is to build a railroad from the Norfolk & Western through Giles and Bland counties, Va. It has \$100,000 capital stock. This is probably the proposed 10-mile logging road of the Youkin Lumber Co., of Narrows, Va. (Va. Roads, Feb. 24, p. 146.)

**YUKON & HUDSON.**—The Dominion Government has granted to this company power to build railroads, telegraph and telephone lines, etc., from Chesterfield Inlet on Hudson Bay, west to the Great Slave Lake. This lake connects with the Mackenzie River, on which vessels will be run northwest through the territory. There will also be required two sections of railroad about 60 miles in length around rapids on the river.

#### GENERAL RAILROAD NEWS.

**ALABAMA & FLORIDA.**—At a recent meeting of the stockholders the capital of the corporation was authorized to be increased from \$200,000 to \$750,000. The company is building a line from Gloriana, Ala., southeast 75 miles to Geneva. (Railroad Construction column, April 7, p. 252.)

**BUFFALO, ROCHESTER & PITTSBURGH.**—The company has made an agreement in favor of the Guaranty Trust Co., as trustee, to secure an issue of \$500,000 4½% 20-year equipment gold bonds, to

**CHICAGO & EASTERN ILLINOIS.**—The Appellate Division of the Supreme Court in New York City on June 9, dismissed a case brought by this company against the Central Trust Co. to compel the Trust Co. to take \$279,000 of its bonds of Sept. 1, 1877, and to deliver in return an equal amount of its general consolidated and first mortgage bonds of Nov. 1, 1887. The railroad company claims that the trust company was required under the terms of the mortgage agreement to make this exchange, but the trust company cites a provision in the submission which is allowed by the Appellate Court and the case is dismissed.

**CHICAGO GREAT WESTERN.**—Formal call is made for the Chicago, St. Paul & Kansas City 5% prior lien bonds of 1889, aggregating \$2,823,150, to be paid at 105 on Jan. 1, 1900, at the Merchants' Trust, Ltd., 63 Cornhill, London, E. C. (Feb. 10, p. 111.)

**COLUMBUS, HOCKING VALLEY & TOLEDO.**—Defaulting judgments were taken June 7, in the U. S. Court at Columbus, arising out of deficiencies under various bonds recently sold under foreclosure as follows: Security Trust Co., \$2,111,786; M. E. Ingalls, Jr., et al., two judgments of \$5,056,093 and \$2,276,949. (May 26, p. 380.)

**DALLAS PACIFIC & SOUTHEASTERN.**—This property was sold at public auction at Dallas, Tex., June 9, subject to outstanding obligations, to Henry M. Skelton, of Dallas, for \$15. The company was chartered in 1890 by J. E. Henderson and others, of New York, to build a railroad from Sabine Pass, Tex., northwest through Dallas to Archer City. About 18 miles northwest from Dallas has been graded.

**DETROIT & TOLEDO SHORE LINE.**—This company has filed a mortgage for \$3,547,500. The company was incorporated April 14 in Michigan, to build the Pleasant Bay Ry. to Detroit on the north, and to take over the Toledo & Ottawa Beach, building between Detroit and Toledo, O. The bonds are to be used as follows: For building 13 miles from Detroit to Trenton, \$364,000; 40 miles from Trenton to Toledo, \$720,000; equipment, \$560,500; purchase of the Ottawa Beach Ry., \$100,000; additional spurs, \$100,000; a six-mile spur, \$78,000; terminals at Toledo, \$300,000; double tracking, \$954,000; equipment and working capital, \$371,000.

**DETROIT, GRAND RAPIDS & WESTERN.**—The \$770,000 of Iowa & Lansing first mortgage 5% bonds, due July 1, will be replaced by D., G. R. & W. 4's of 1897, due April 1, 1946. Of the total authorized issue of \$6,000,000 of these new bonds, \$5,379,000 will be outstanding after July 1. The rest of the issue is reserved for additions.

**FLINT & PERE MARQUETTE.**—We give in this connection a map of Lower Michigan, showing the consolidated roads of the F. & P. M., the Detroit, Grand Rapids & Western, and the Chicago & West Michigan. When fully consolidated, these roads will represent a mileage of 1,687. The capital stock will be \$16,000,000 common, \$12,000,000 pre-

July 1) for each \$1,000 old bond, accrued interest on the old bonds from Jan. 1 to June 30, 1899, to be paid on July 1. (Nov. 25, 1898, p. 859.)

**PITTSBURGH, BESSEMER & LAKE ERIE.**—Stockholders of record, on June 1, were granted the privilege until June 15, of subscribing at par for the new preferred stock equal to 20% of the par value of the stock held, and for debenture bonds at 15% of the stock held. (June 9, p. 418.)

**RIO GRANDE WESTERN.**—Spencer Trask & Co., New York, and Lee, Higginson & Co., Boston, on June 15 offered for sale the unsold balance of an issue of \$1,500,000 first consolidated mortgage 4 per cent gold bonds at 87½ and accrued interest. These bonds are a first lien on about 110 miles of railroad already built, and 25 miles additional now building up Provo Canyon to coal mines in the Pleasant Valley. (March 17, p. 200; Railroad Construction column, June 9, p. 418.)

**TEXAS & PACIFIC.**—At the request of holders of a considerable number of income and land grant bonds and scrip of this company, J. D. Probst, G. W. Norton and J. W. Barr, Jr., have consented to act as a committee for the protection of the holders. These holders are requested to deposit their bonds and scrip with the Continental Trust Co., New York, or with its agent, the Fidelity Trust & Safety Vault Co., of Louisville, Ky., on or before July 10.

**TOLEDO, ST. LOUIS & KANSAS CITY.**—A subcommittee consisting of Messrs. Armour, Paton and Bannard has asked the bondholders to give them an option to buy for cash their certificates at 100 and 4% interest since the default, or about 126. Large bondholders, however, have lately received bids for calling their bonds at 130 at any time before Oct. 15. (June 9, p. 418.)

**WISCONSIN CENTRAL.**—The plan for reorganization, dated April 10, has been declared operative, and the foreclosure sale, as already noted, will take place July 7. Holders of \$11,120,000 W. C. first mortgage bonds have already deposited the same, and holders of the outstanding \$145,000 should deposit them prior to June 30. Holders of income bonds, preferred stock and common stock are requested to deposit the same on or before June 30, with the payments of 75% of the sums required under the reorganization plan. (June 9, p. 418.)

#### TRAFFIC.

##### Traffic Notes.

It is reported that rates on pig iron from Alabama mines to Ohio River points will be advanced 50 cents a ton on June 21.

The State Railroad Commissioner of Alabama, at a hearing held in Montgomery, June 7, repealed an order issued not long ago reducing freight rates on hay and corn generally throughout the State.

The Federal Grand Jury at Beaumont, Tex., has found an indictment against a hardware firm of Louisville, Ky., for giving a false classification to freight shipped from Louisville to Texas.

Press despatches from Columbus, O., say that the war in rates on coal from Southern Ohio to Lake Erie ports, which has prevailed for some time and has carried rates down to a very low level, has been settled, and that on June 19 rates will be advanced.

The New Haven Steamboat Co. began running a boat each way nightly between New York and Providence on June 12. The Providence Line, which carries passengers only in the summer, at once opened for business, though usually the passenger service of this line is not begun until a week or two later. The New Haven Line makes the fare \$2.50, which is half a dollar less than the regular rate by the old line in former years. The boats of the new line will stop at New Haven in both directions.

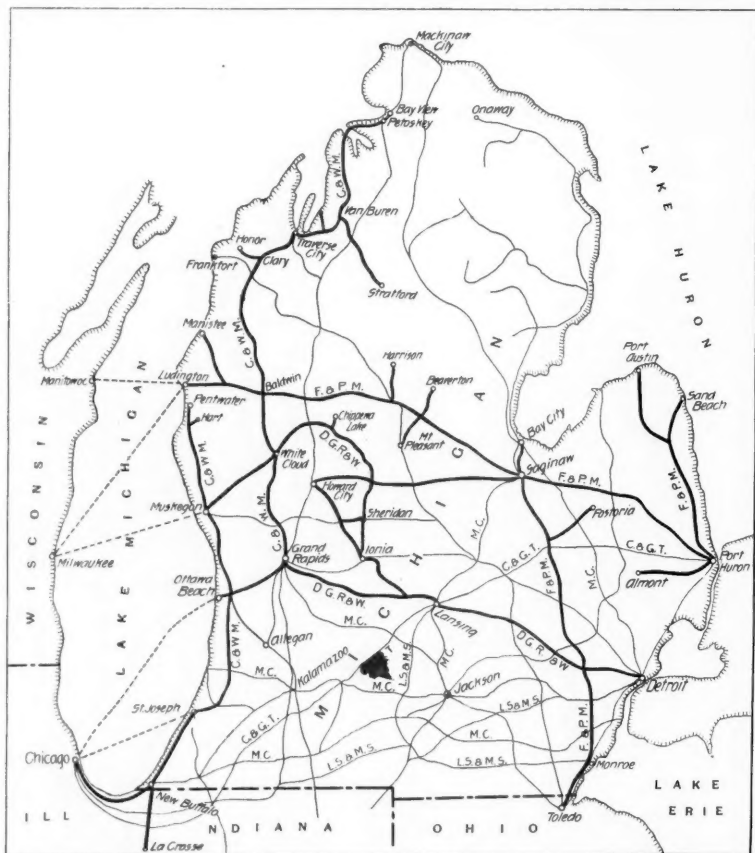
The Ogdensburg Transit Co., running freight vessels on the lakes from Ogdensburg, N. Y., westward, has established a new lake and rail line from New York to the West to take the place of the line hitherto run over the Central Vermont steamboat line and railroad, which has had to be discontinued on account of the change in ownership of the Central Vermont. The new line is by the Murray Line (steamers) from New York to Troy, the Delaware & Hudson Railroad from Troy to Moores Junction, and thence by the Ogdensburg & Lake Champlain Railroad.

The separate car law went into effect in North Carolina on June 1. On the Seaboard Air Line local trains have a first class and a second class car for whites, and for the blacks a single car with a partition in the middle, one-half being assigned to first class passengers and the other to second class. The first class compartment is "handsomely fitted up with marble basin and other conveniences." The Wilmington Star says that separate cars or compartments are furnished by the Wilmington Seacoast Railroad, although the road is a short line which does not come within the terms of the law. The road makes the change voluntarily, out of regard for the wishes of a great majority of its patrons.

A press despatch from Louisville states that in consequence of numerous prosecutions for violation of the long and short haul law, the Louisville & Nashville Railroad is about to give up its sales agency for Kentucky and Tennessee coal. The road has recently been fined \$2,000 in each of seven cases at Lebanon on the charge of excessive freight rates, and it must now either greatly advance the rate to Louisville or make reductions to points south of there, where it has no competition. It is impossible to compete with Pittsburgh coal brought by water except by making the freight very low.

#### Florida Anti-Scalper Law.

The Legislature of Florida has passed a law requiring common carriers to provide each ticket seller with a certificate of authority, to be posted in a conspicuous place at the ticket office, and making it unlawful for any unauthorized person to sell, barter or transfer a ticket or other evidence of transportation; with a proviso, however, that the purchaser of a transferable ticket, in good faith, for his own use, may sell the same to another who will, in good faith, prosecute the journey. It is also provided that a ticket agent may buy from another company a ticket for a passenger on his own road to enable the passenger to reach the said road. Elaborate provisions are made for the redemption of tickets, 35 days being the limit within which claims must be settled. Severe penalties are provided for infraction of any of the clauses of the law; and forging or altering a ticket is made a felony.



The Consolidated Lines of the F. & P. M., the D., G. R. & W., and the C. & W. M.

be known as series A. They are not subject to call, but a sinking fund of 5% annually is to be applied for their purchase, when possible, at or below par; otherwise to the purchase of additional equipment, to be subject to their lien.

**BUSK TUNNEL.**—The bondholders have reached an agreement with the Colorado Midland whereby the Busk Tunnel bonds, aggregating \$1,250,000, are to be exchanged for Colorado Midland 2-3-4's at par, together with cash covering 4% interest, less legal expenses, for the period of the receivership, estimated at \$140 to \$150 per bond. This interest payment is in settlement of the judgment for \$176,000 obtained by the B. T. against the C. M. for rental. This money has been held by the Trust Company pending negotiations. The interest charges will use about \$91,000 and the \$85,000 remaining will be returned to the C. M. treasury. The new bonds are to be ready for exchange about June 16. (Oct. 28, 1898, p. 787.)

ferred, and the funded debt, including underlying bonds of controlled companies, will aggregate \$24,811,465. It is reported that the new company is to be known as the Michigan & Pere Marquette. All of the companies involved have consented to the terms of the consolidation. The Safe Trust Co., of New York, and the Old Colony Trust Co., of Boston, will receive deposits of stock up to June 20. (June 2, p. 393.)

**NEW ORLEANS & WESTERN.**—Judge Parlange, in the United States Circuit Court, at New Orleans, on June 3, qualified W. C. Dotterer, heretofore Vice-President and General Manager, as Receiver, to succeed Chas. B. Van Nostrand, who resigned May 31. (Sept. 19, 1898, p. 604.)

**NORTHERN PACIFIC.**—Holders of the old general first mortgage 6% gold bonds are notified that they may exchange the same for new prior lien 4% bonds on the basis of \$1,100 new bonds (ex-coupon due